

# The supply chain management system for the delivery and maintenance of infrastructure by organs of state

## INTRODUCTION

Infrastructure comprises fixed assets that are constructed or result from construction operations including:

- buildings, structures and facilities
- water supply, sanitation, electricity supply, transportation and stormwater drainage systems
- the related permanent fixtures that cannot be readily or economically removed or reused.

Sections 38 and 51 of the Public Finance Management Act 2000 (PFMA) require accounting officers and accounting authorities respectively to ensure that their institutions have and maintain a number of systems relating to risk and financial management, internal control, internal audit, procurement, provisioning and the evaluation of major capital projects. The PFMA Supply Chain Management regulations also prescribe that institutions implement a supply chain management system.

The Infrastructure Delivery Management System (IDMS) has been developed through the Infrastructure Delivery Improvement Programme (IDIP), a partnership between the National Treasury, the CIDB (Construction Industry Development Board), the Departments of Public Works, Education and Health, and the DBSA (Development Bank of Southern Africa) with the support of provincial departments. It is a government management system for planning, budgeting,

procurement, delivery, maintenance, operation, monitoring and evaluation of infrastructure (CIDB and National Treasury 2010a). It comprises a set of interrelating or interacting elements that establish processes which transform inputs into outputs.

## AN OVERVIEW OF THE IDMS

The Infrastructure Delivery Management System comprises the following systems:

- an infrastructure planning system
- an infrastructure gateway systems (IGS)
- a construction procurement system (CPS)
- a programme and project management system
- an operation and maintenance system.

Risks are managed in each of these systems.

The IDMS is designed to be linked to the medium-term expenditure framework (MTEF). It has a strong focus on outcomes, value for money and the effective and efficient functioning of the procurement and delivery management system in compliance with relevant legislation. It includes a supply chain management system (SCM) and can be readily integrated into the various systems that accounting officers and accounting authorities are required to implement as indicated in Figure 1. There are three functionaries that interface with each other in the IDMS namely:

- The client, i.e. the institution which is ultimately responsible and accountable for the delivery of services and

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This article follows on the infrastructure delivery article in the May 2012 edition of *Civil Engineering* (page 46) and links the infrastructure delivery management system to the supply chain management system, which organs of state are required to put in place in terms of the Public Finance Management Act and Municipal Finance Management Act

their organisational strategy, service and delivery plans and annual performance plan.

- The implementer, i.e. an institution or unit within an institution responsible for the delivery of infrastructure or scheduled maintenance projects.
  - The custodian, i.e. the institution which acts as the caretaker of immoveable assets (land and infrastructure) throughout its lifecycle.
- Broadly speaking, the client is responsible for planning activities at a portfolio level, the monitoring and evaluation of the delivery of projects and the

acceptance of most of the deliverables in the Infrastructure Gateway System (IGS). The implementer is responsible for the delivery and scheduled maintenance of infrastructure in terms of the IGS, while the custodian is a caretaker responsible for ensuring that the condition of infrastructure is assessed, and maintenance requirements are determined and budgeted for. In some instances, e.g. provincial transport infrastructure, the client, implementer and custodian are the same institution. In many instances, e.g. the education and health facilities, this is not the case.

## SUPPLY CHAIN MANAGEMENT SYSTEMS

### Introduction

Supply chain management involves the design, planning, execution, control and monitoring of supply chain activities in the delivery of products and services with the objective of creating net value. It provides oversight and coordination of information and finances within the supply chain. The supply chain management function as such links into all the other organisational systems required by the PFMA, as illustrated in Figure 1.

There are a number of distinctly different supply chains. For example, the supply chain for the supply of general goods (i.e. manufactured products or materials) involves demand management, the sourcing, purchasing, receipt, storage and issuing of goods to employees (end users). On the other hand, the supply chain for the delivery of infrastructure involves the planning processes at both a portfolio and package level and the procurement and management of a network of suppliers, including subcontractors, to produce a product on a site (i.e. works). The risks that need to be managed and the performance metrics between a supply chain involving the delivery of infrastructure are very different to one involving the purchasing, storing and issuing of goods.

The supply chain management system (i.e. the set of interrelating elements comprising processes which transform inputs into outputs) which is embedded in the IDMS comprises the following three elements (see Figure 2):

- the CIDB Infrastructure Gateway System (CIDB 2010)
- the CIDB / National Treasury IDM Toolkit Programme and Project Management System for the delivery of programmes of projects or independent projects (CIDB and National Treasury 2010)
- a Construction Procurement System (Watermeyer 2011a).

### The CIDB Infrastructure Gateway System

The CIDB Infrastructure Gateway System (IGS) (CIDB 2010) forms the backbone of the IDMS. It provides a number of gates (control points) in the delivery and maintenance of infrastructure where a decision is required before proceeding from one stage to another. Such decisions need to be based on information that is provided, and if correctly executed,

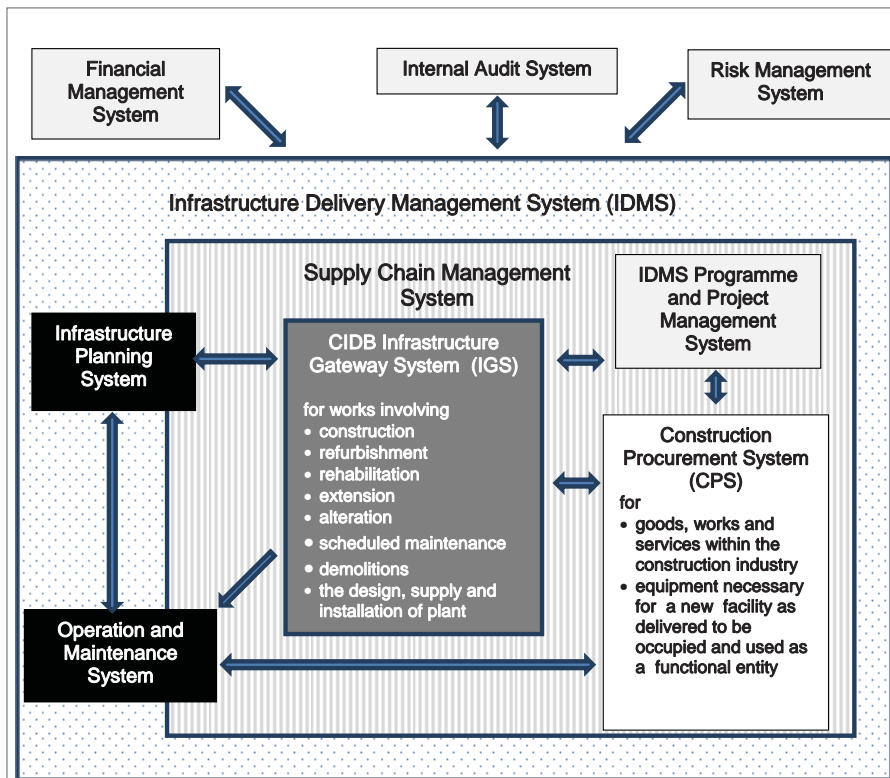


Figure 1: The linkages between systems within an institution

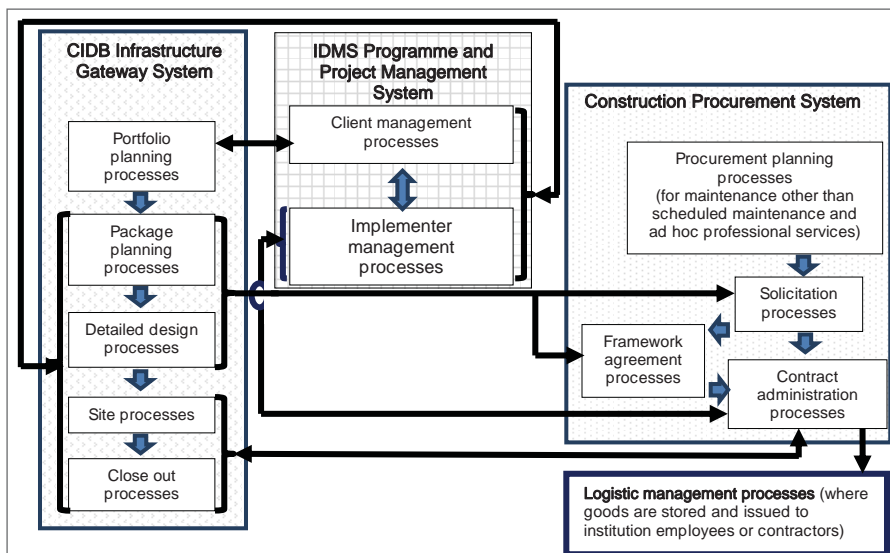


Figure 2: Supply chain management processes embedded within the IDMS

provide assurance that a project involving the delivery or scheduled (planned) maintenance of infrastructure remains within agreed mandates, aligns with the purpose for which it was conceived and can progress successfully from one stage to the next. The CIDB IGS is based on the information flow as set out in Figure 3. This system permits the undertaking of groups of activities in parallel or series and results in a predetermined deliverable (a tangible and verifiable work product) and a structured decision point at the end of each stage. This enables decisions to be made if a project or a package (works which have been grouped together for delivery under a single contract or a package order) should continue to its next stage, and if adjustments between what was planned and what is to be delivered need to be made.

The CIDB IGS enables major capital projects to be subjected to an independent gateway review prior to the completion of the package planning processes, i.e. before a commitment to implement a project is made. Such a

review should focus on deliverability, affordability and value for money.

A key innovation in the IGS is the introduction of the procurement planning stage (stage 2) which requires that a construction procurement strategy be developed for the implementation of an infrastructure plan at a portfolio level (CIDB and National Treasury 2010b, Watermeyer 2011b). Construction procurement strategy is the combination of the delivery management strategy (decisions relating to the meeting of needs and the packaging of projects), contracting arrangements and procurement arrangements relating to the delivery or planned maintenance of works. An outcome of this process is the identification of packages (works to be delivered under a single construction works contract or a package order issued in terms of a framework agreement) and contracts for professional services.

One of the products of this system is an infrastructure plan (e.g. in the case of national and provincial departments, a User Asset Management Plan (U-Amp)) which identifies needs and specifies the

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high-level scope, budget, schedule, priority and geographical location of projects for at least an MTEF period. This is the output of the first stage of the IGS, which is followed by further portfolio planning processes to intelligently allocate projects to packages for delivery in terms of a single contract or a package order issued in terms of a framework agreement, which in turn are assigned to programmes of projects or independent projects.

Planning processes at a package level (see Figure 3) to deliver programmes of projects or independent projects follow

the portfolio planning processes. Such processes scope, test the feasibility of and cost the proposed works associated with a package. These planning processes are followed by design processes aimed at the development of production information enabling construction, processes relating to the physical work on a site, processes associated with the handover of the completed works to the end user, and finally processes relating to the capture of data in the asset register. Procurement processes, depending upon the contracting strategy that is adopted (i.e. allocation of manage-

ment and design responsibilities), take place somewhere within the planning and design processes.

### IDMS Programme and Project Management System

Two important documents that are annually developed to manage and resource delivery from an institution's point of view are the Infrastructure Programme/Project Management Plan (IPMP) and the Infrastructure Programme/Project Implementation Plan (IPIP). These documents relate to either a programme of projects or independent projects, and are

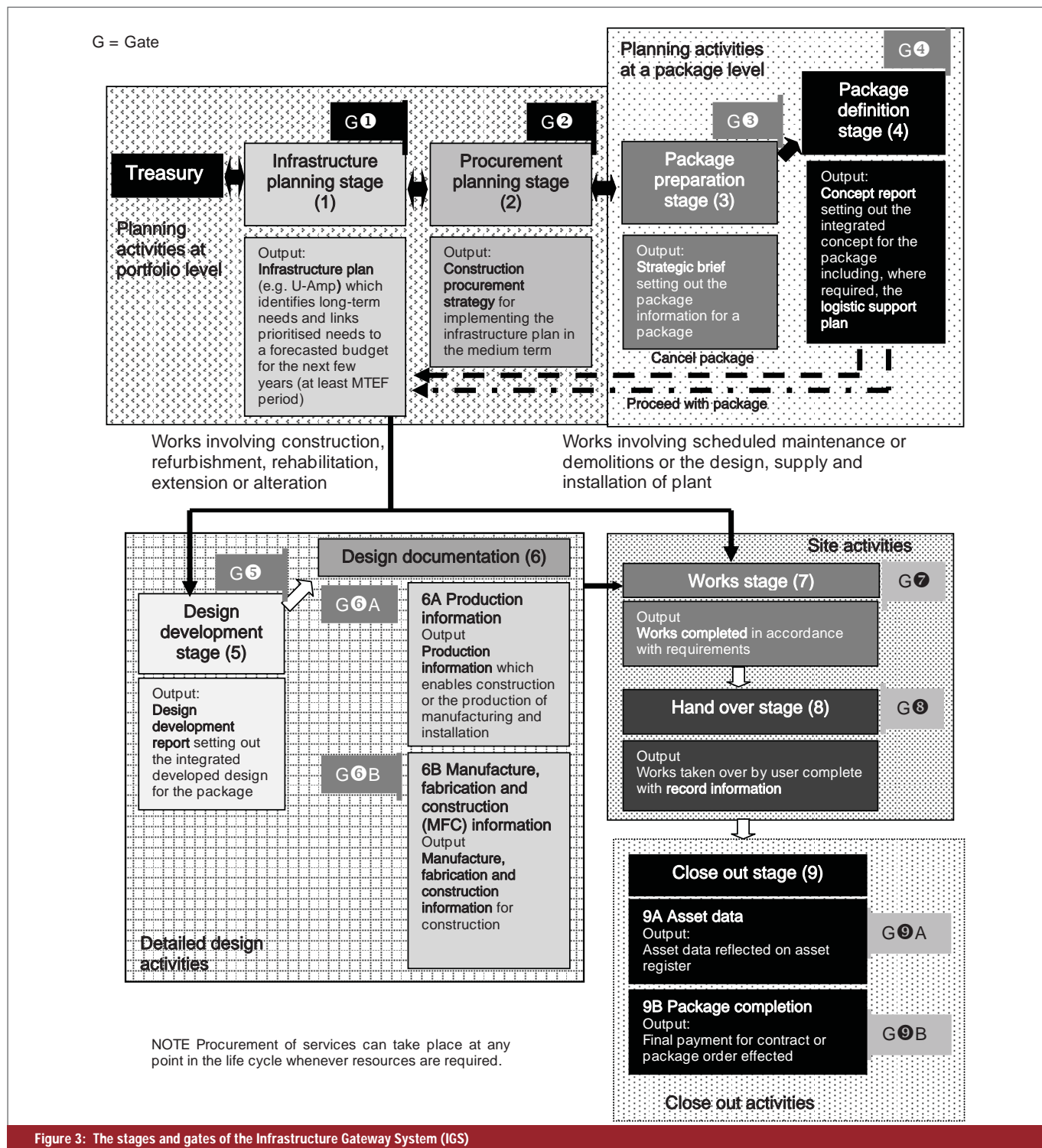


Figure 3: The stages and gates of the Infrastructure Gateway System (IGS)

developed by the client and implementer respectively. Where the client and the implementer are the same institution, the IPMP is collapsed into the IPIP.

The IPMP establishes the client's arrangements for the management of programmes of projects / independent projects over the MTEF period and indicates the allocation of the MTEF budget to the projects to be implemented over the MTEF period. It strengthens client oversight and needs to be aligned with the adopted construction procurement strategy. It should include matters such as programme/project objectives, client support structures, key success factors and the key performance indicators, identified risks and associated risk mitigation arrangements and a communication plan which determines the lines of communication. It furthermore creates an alignment between planning and budgeting. This enables an MTEF project list to be generated so that the planning and design processes can start timeously to ensure expenditure in financial year budget projections.

The IPIP is the implementer's response to the client's IPMP. As such it should assign resources for implementation and responsibilities, provide cash flow forecasts, establish milestone dates for key deliverables in respect of each package and describe controls and measures which will address health, safety, environmental and other project risks. The IPIP focuses on managing package scope, time and cost. It enables "actual versus planned" expenditure, and time lines to be compared at a package or programme/project level.

A service delivery agreement is entered into where the client and implementer are not the same institution. This document records the agreements reached in respect of the IPMP and the IPIP, as well as issues such as roles and responsibilities, contributing, institutional mechanisms, dispute resolution procedures and financial arrangements. It is annually reviewed and amended/updated as soon as possible after the finalisation of the IPIP, but not later than 31 March each year in the case of national and provincial departments. It provides the authorisation

to the implementer to proceed with the implementation of the projects contained therein for an MTEF year.

#### **Construction Procurement System**

Procurement is the process which creates, manages and fulfils contracts. Procurement commences once a need for goods, services, engineering and construction works or disposals has been identified, and it ends when the goods are received, the services or engineering and construction works are completed or the asset is disposed of.

There are six basic activities associated with procurement processes which establish actions and deliverables/milestones associated with the procurement process, as indicated in Figure 4. Procedures and methods used in conjunction with policies guiding the selection of options and the application thereof are required to implement these procurement processes. Procurement documents are needed to communicate to tenderers a procuring entity's procedures and requirements up to the award of a contract, and to establish the basis

for the contract that is entered into with the successful tenderer, i.e. the agreed terms and conditions, the prices, and the nature and quality of the goods, services or construction works that are required.

Procurement processes and procedures need to be managed and controlled (see Figure 4). Accordingly, governance activities need to be linked to milestones in the procurement process. At the same time, policies are required to govern the usage and application of particular procurement procedures, requirements for recording, reporting and risk management, procedures for dealing with specific procurement-related issues, assignment of responsibilities, etc.

Procurement processes are accordingly underpinned by methods and procedures and are informed and shaped by the policies of the procuring entity. A procurement system therefore comprises the following (Watermeyer 2011a):

- rules and guidelines governing procedures and methods
- procurement documents which include terms and conditions, procedures and requirements
- governance arrangements to manage and control procurement
- organisational policies which deal with a range of specific procurement issues.

### SCM Controls

There is a relationship between achieving operational objectives, managing risks and maintaining effective controls. Risk (the effect of uncertainty on objectives) can impact upon an institution's ability to achieve objectives, including those relating to compliance with legislative requirements, fraud and corruption.

Operational activities can mitigate risks. Effective controls are, however, needed to reasonably ensure that:

- strategic and operational objectives are achieved
- workplace integrity and regulatory responsibilities are met
- resources are effectively and efficiently used and protected from fraud, waste and mismanagement
- decision-makers are provided with reliable and timely information
- information loss is minimised.

The SCM system comprises a number of interacting and interrelating elements with a number of processes and sub-processes that convert inputs into outputs in the form of deliverables. The logical loca-

tion of a control point is at the end of such processes. The IGS, CPS and the IDMS Programme and Project Management System which collectively constitute the IDMS's SCM system, incorporate gates which are linked to deliverables as shown in Figure 5. These gates (or control points) require a decision to be made before proceeding and are in the main tied tightly to the management of risks.

## INSTITUTIONALISING THE IDMS SCM SYSTEM

In order to institutionalise and operationalise the SCM system embedded within government's IDMS system within an institution, the following need to be identified and documented:

- **Institutional arrangements** – the manner in which the institution interfaces and relates to other institutions in implementing the IDMS,

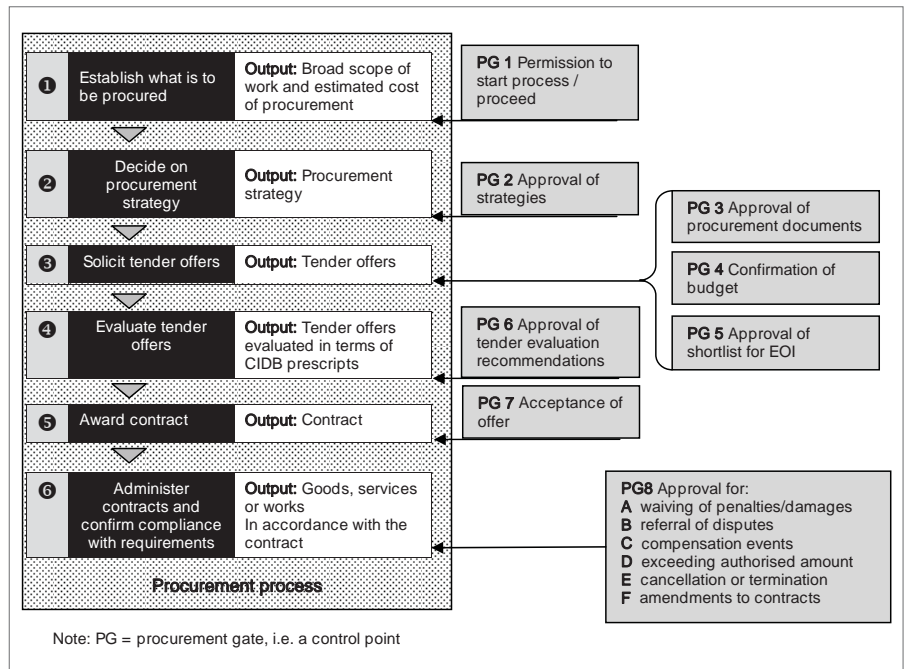


Figure 4: Procurement activities and control points associated with the procurement process

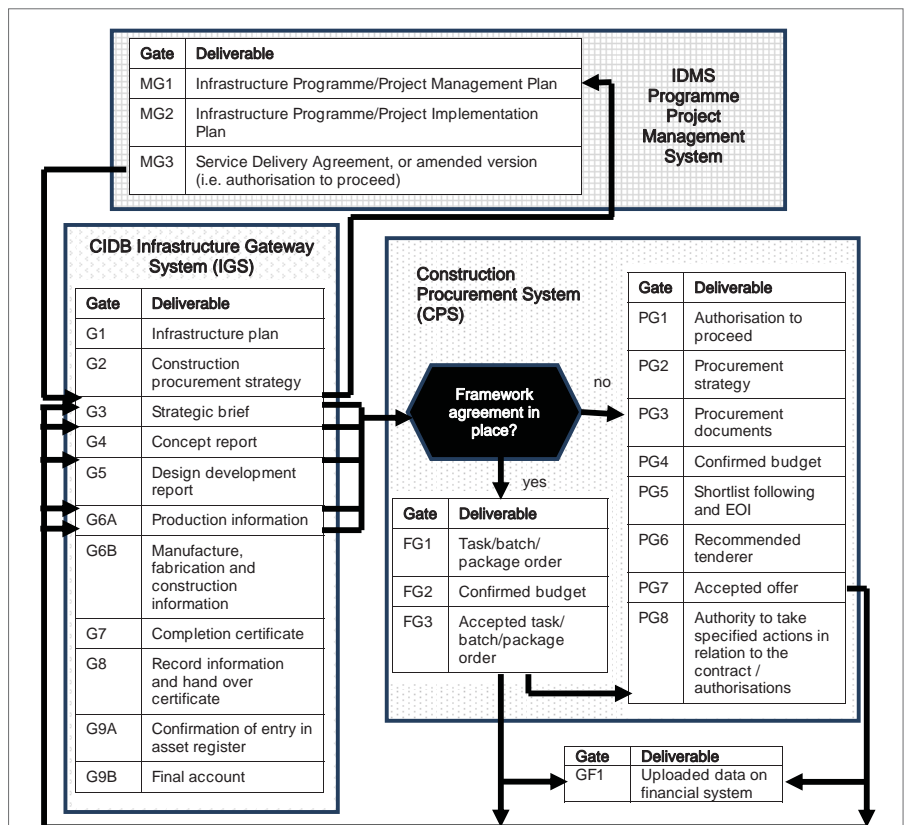


Figure 5: Gates (control points) within infrastructure processes

including financial arrangements and the provision of planning budgets to enable package planning to take place in advance of an MTEF allocation.

- **Organisational capacity** – management and operational capacity to fulfil defined functions in an accountable and responsible manner.
- **Systems** – policy, allocation of responsibilities, processes, procedures, methods and procurement documentation to provide order and a platform for the methodical and systematic attainment of system objectives.
- **Risk / quality oversight (governance and performance) controls** – predefined policy or set of measures to be met prior to proceeding with processes in order to ensure that the outputs and outcomes are achieved to the requisite quality, within an acceptable risk exposure and acceptable levels of performance.

The starting point is to document the systems and risk/quality oversight controls and, where possible, institutional arrangements to:

- enable communication of intent and consistency of action, and
- assign responsibilities.

Generic standards (documents which provide for common and repeated use, rules, guidelines, or characteristics for activities or their results, aimed at the achievement of an optimum degree of order in a given context) need to be developed to document the above. Such standards also need to establish requirements for end of process deliverables which form the basis of decisions at gates (control points), as well as requirements for the retention of records to provide evidence of conformity to requirements. They should also be crafted in such a way as to enable delegations and responsibilities to be readily assigned, and require that data be provided to facilitate the monitoring of performance. This will establish the standards against which institutions may be audited.

The CIDB has developed a number of generic standards, namely the *Standard for Uniformity in Construction Procurement*, the *Standard for the Delivery and Maintenance of*

*Procurement processes and procedures need to be managed and controlled. Accordingly, governance activities need to be linked to milestones in the procurement process. At the same time, policies are required to govern the usage and application of particular procurement procedures, requirements for recording, reporting and risk management, procedures for dealing with specific procurement-related issues, assignment of responsibilities, etc*

*Infrastructure using a Gateway System* and Practice Guide No 2, *Construction Procurement Strategy*. The International Organisation for Standardisation (ISO) has published a series of international standards for construction procurement which are compatible with the CIDB Standard for Uniformity in Construction Procurement. These standards can form the basis for the two standards described in Table 1. The Western Cape Provincial Treasury has developed such standards (Western Cape Provincial Treasury 2012). These standards document the IDMS SCM system and controls, and certain institutional arrangements, in a manner in which responsibilities can be readily assigned. This provides a solid platform for the institutionalisation of the IDMS SCM system within institutions, as institutions need only to align existing organisational structures, the reporting lines and managerial support processes and their systems within units with these standards. This requires, amongst other things, the establishment of posts and the alignment of performance agreements to job descriptions to these standards.

### A SEPARATE SUPPLY CHAIN FOR THE DELIVERY AND MAINTENANCE OF INFRASTRUCTURE

The current approach to SCM (acquisition, demand, logistics and risk management) as embodied in the Supply Chain

Management regulations issued in terms of Public Finance Management Act 1999, and the Municipal Finance Management Act 2003, is well suited for general goods and services procured by institutions. It is not suitable for the delivery and maintenance of infrastructure. The notion that an SCM unit within the office of the chief financial officer should implement (as apposed to manage) an SCM system for the delivery and maintenance of infrastructure is also inappropriate, as this system requires a very different set of skills to do so, and the entire supply chain in the case of national and provincial departments is frequently located within more than one institution. Furthermore, the overarching objectives of the two systems are very different. The SCM system for general goods and services focuses on consumption and operational needs, whereas the SCM system for the delivery and maintenance of infrastructure focuses on the provision and maintenance of infrastructure that is necessary to deliver on an institution's service delivery mandate.

There are accordingly more differences between the SCM system for general goods and services and that for the delivery and maintenance of infrastructure than there are commonalities. The processes, linkages within and between institutions, skills requirements and contexts are markedly different. Attempting to deal with both

types of SCM systems in a single set of regulations is difficult and confusing. It is preferable to produce separate SCMs for both types of SCM systems.

### REFERENCES

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**Table 1** The scope of standards which document the SCM system for the delivery and maintenance of infrastructure

Title	Scope
Standard for an Infrastructure Delivery Management System	<p>This standard establishes an Infrastructure Delivery Management System comprising processes, procedures and methods within an institution for the delivery or maintenance of infrastructure in a staged systematic, disciplined, uniform and auditable manner such that:</p> <ol style="list-style-type: none"> <li>responsibilities are clearly allocated</li> <li>decisions taken at gates (control points) provide assurance that the proposed works               <ol style="list-style-type: none"> <li>remains within agreed mandates</li> <li>aligns with the purpose for which it was conceived</li> <li>can progress successfully from one stage of the Infrastructure Gateway System (IGS) to the next</li> </ol> </li> <li>projects can be readily tracked and performance monitored</li> <li>progress and key performance indicators can be monitored at each stage of the IGS</li> <li>compliance can be monitored</li> <li>projects satisfy client requirements.</li> </ol>
Standard for a Construction Procurement System	<p>This standard establishes a construction procurement system within an institution for the procurement of:</p> <ol style="list-style-type: none"> <li>goods, services and engineering and construction works and disposals relating to the construction industry in a fair, equitable, transparent, competitive and cost effective manner</li> <li>goods or services necessary for a new facility as delivered to be occupied and used as a functional entity</li> <li>temporary facilities.</li> </ol> <p>The standard does not apply to:</p> <ol style="list-style-type: none"> <li>the storage of goods and equipment following their delivery to an institution, and which are stored and issued to contractors or to officials</li> <li>the procurement of non-construction industry-related goods and services or land, except as provided for in the above</li> <li>the sale, exchange, donation, leasing or letting of land or a building</li> <li>the conclusion of any form of land availability agreement.</li> </ol>