A systems approach to the **effective delivery of infrastructure**

Dr Ron Watermeyer
SAICE President 2004
watermeyer@ssinc.co.za

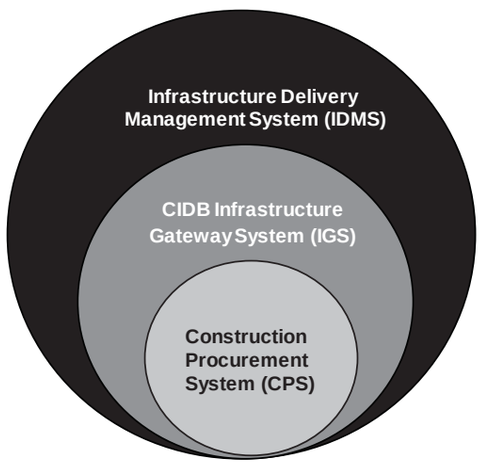
INTRODUCTION

Skills and systems are required to efficiently and effectively deliver infrastructure. Systems are underpinned by:

- **processes** – a succession of logically related actions occurring or performed in a definite manner which culminate in the completion of a major deliverable or the attainment of a milestone
- **procedures** – the formal steps to be taken in the performance of a specific task, which may be evoked in the course of a process
- **methods** – a documented, systematically-ordered collection of rules or approaches.

Systems need to be supported by policy, governance/management arrangements, and documentation which communicate what has been decided upon during the execution of a process or part thereof.

Systems, processes, procedures and methods can be standardised and documented for common and repeated use for the achievement of the optimum degree of order in a given context. This in turn provides a solid platform for effective skills development, as it permits staff to work in a uniform and generic manner, and



Notes:
1 The CPS can be applied almost anywhere within the IGS
2 The IDMS is structured around the IGS and CPS

Figure 1: The relationship between the various systems

training interventions to be developed to capacitate those engaged in the performance of various activities.

The CIDB (Construction Industry Development Board), in partnership with other organs of state, has since its inception in 2000 developed the following systems to support infrastructure delivery:

- A construction procurement system (CPS), which enables contracts to be created, managed and fulfilled, relating to the provision of goods, services and engineering and construction works or disposals or any combination thereof.
- An Infrastructure Gateway System (IGS), which provides a number of control points (gates) in the infrastructure delivery management process where a decision is required before proceeding from one stage to another.
- The Infrastructure Delivery Management System (IDMS), which forms the backbone of the management of projects relating to the delivery and maintenance of infrastructure.

These three systems interact with one another as illustrated in Figure 1 and, if systematically and correctly applied, have the potential to improve the performance of public sector clients in the delivery and maintenance of infrastructure. This can make a major contribution to job creation and thereby to stimulating economic growth.

CONSTRUCTION PROCUREMENT SYSTEM (CPS)

Introduction

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 2. 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 awarding of a contract, and to establish the basis for the contract that is entered into with the successful tenderer, i.e. the agreed

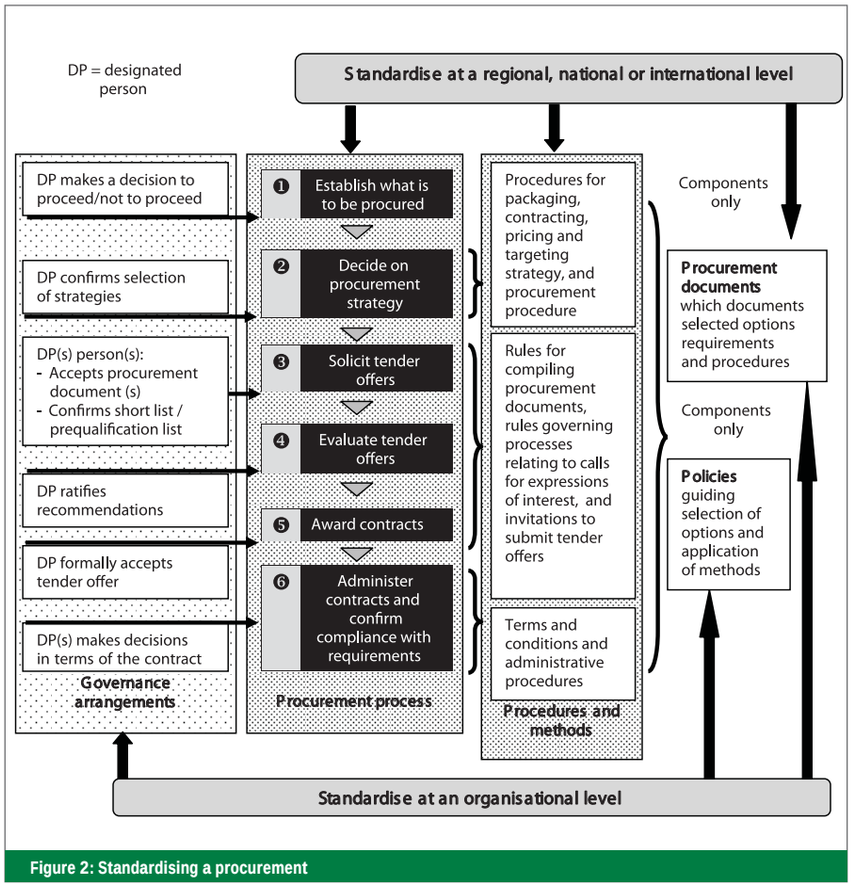


Figure 2: Standardising a procurement

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 2). 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:

- 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 issues such as:
  - the usage and application of particular procurement procedures
  - requirements for recording, reporting and management of risk
  - procedures for dealing with specific procurement issues
  - the usage of procurement to promote social and developmental objectives
  - the assignment of responsibilities for the performance of activities associated with the various processes.

Aligning the CPS with legislation

Section 217 of the Constitution of the Republic of South Africa (Act 108 of 1996) establishes the primary and broad secondary procurement objectives in South Africa as follows:

Primary objective

Procurement **system** is to be fair, equitable, transparent, competitive and cost effective.

Secondary objective

Procurement **policy** may provide for:

a) categories of preference in the allocation of contracts; and
b) the protection or advancement of persons, or categories of persons, disadvantaged by unfair discrimination.

Procurement by organs of state (national and provincial departments, municipalities, constitutional entities and public entities) is also governed by the following pieces of legislation:

- Public Finance Management Act (Act 1 of 1999)
- Local Government: Municipal Finance Management Act (Act 56 of 2003)
- Promotion of Administrative Justice Act (Act 3 of 2000)
- The Promotion of Equality and the Prevention of Unfair Discrimination Act (Act 4 of 2000)
- Preferential Procurement Policy Framework Act (Act 5 of 2000)
- Construction Industry Development Board Act (Act 38 of 2000)
- Broad-Based Black Economic Empowerment Act (Act 53 of 2003)
- Prevention and Combating of Corrupt Activities Act (Act 12 of 2004)

Section 76(4) of the Public Finance Management Act permits National Treasury to make regulations or issue instructions applicable to all institutions to which the Act applies, concerning *the determination of a framework for an appropriate procurement and provisioning system which is fair, equitable, transparent, competitive and cost effective*.

The procurement provisions of the Municipal Finance Management Act are similar, but contain more details regarding the system. Section 112 permits the Minister of Finance to issue a prescribed regulatory framework for supply chain management that covers a number of specific issues.

The Supply Chain Management Regulations issued in terms of the Public Finance Management Act and Municipal Finance Management Act establish requirements for the governance of procurement processes, and establish high-level government policy. Each organ of state has to determine its own procedures and policies which are consistent with the legislative framework.

The Construction Industry Development Board Act defines the construction industry as *the broad conglomeration of industries and sectors which add value in the creation and maintenance of fixed assets within the built environment.* Accordingly, construction procurement involves not only engineering and construction works contracts, but also:

- supply contracts that involve the purchase of construction materials and equipment
- service contracts relating to any aspect of construction, including professional services, and
- the disposal of surplus materials and equipment and demolitions.

The CIDB has issued the following prescripts in terms of the Construction Industry Development Board Act which are applicable to all organs of state when procuring goods, services or works from the construction industry:

- a CIDB Code of Conduct for the Parties engaged in Construction Procurement
- a CIDB Standard for Uniformity in Construction Procurement (CIDB, 2004), which establishes minimum requirements for:
  - the solicitation of tender offers using standard conditions for the calling for expressions of interest and standard conditions of tender
  - the use of standard forms of contract
  - a range of standard procurement procedures and methods
  - the formatting and compilation of procurement documents
  - the application of the register of contractors to public sector contracts.

Best practice guidelines recognised by the Construction Industry Development

Table 1 Typical contents of a document describing an organisation's Construction Procurement System

Section heading	Clause headings	Clause sub-headings
1 Scope		
2 Terms, definitions and abbreviations	2.1 Terms and definitions 2.2 Abbreviations	
3 Normative references		
4 Requirements	4.1 General requirements	
	4.2 Conduct of those engaged in construction procurement processes or procedures	4.2.1 General requirements 4.2.2 Conflicts of interest 4.2.3 Evaluation of submissions received from respondents and tenderers 4.2.4 Non-disclosure agreements 4.2.5 Gratifications, hospitality and gifts 4.2.6 Breaches 4.2.7 Placing of contractors under restrictions
	4.3 Procurement activities, key actions, responsibilities and gates	
	4.4 Roles and responsibilities in relation to the procurement processes, activities and controls	4.4.1 Documentation Review Team 4.4.2 Evaluation Panels Construction 4.4.3 Procurement Committee 4.4.4 Disposal Committee 4.4.5 Delegated Authority to award a contract or order 4.4.6 Compliance monitoring and auditing
	4.5 Complaints and challenges	
	4.6 Secondary procurement policy	4.6.1 General requirements 4.6.2 Permitted targeted procurement procedures 4.6.3 Broad Based Black Economic Empowerment
	4.7 Usage of standard procurement procedures	4.7.1 General requirements 4.7.2 Framework agreements 4.7.3 Lists of pre-approved contractors 4.7.4 Disposals 4.7.5 Unsolicited proposals
	4.8 Procurement documents	4.8.1 General requirements 4.8.2 Standard forms of contract 4.8.3 Auction data 4.8.4 Standardised documents 4.8.5 Tender assessment schedules 4.8.6 Guarantees 4.8.7 Retention 4.8.8 Delay damages 4.8.9 Price escalation 4.8.10 Insurances 4.8.11 Communications 4.8.12 Intellectual property rights 4.8.13 Disputes arising during the performance of a contract 4.8.14 Quality standards 4.8.15 Budgetary items

(continued on page 50)

Table 1 Typical contents of a document describing an organisation's Construction Procurement System (continued)

	4.9 Calls for expressions of interest and invitations to submit tender offers	4.9.1 General requirements 4.9.2 Advertising 4.9.3 Issuing of procurement documents 4.9.4 Clarification meetings and issuing of addenda 4.9.5 Receipt and safeguarding of submissions 4.9.6 Opening of submissions 4.9.7 Evaluation of submissions 4.9.8 Notice to unsuccessful tenderers and respondents 4.9.9 Debriefing of respondents and tenderers 4.9.10 Written reasons for actions taken 4.9.11 Request for access to information
	4.10 Award of contracts	4.10.1 General requirements 4.10.2 Vendor registrations
	4.11 Administration of contracts	4.11.1 General requirements 4.11.2 Records and reporting 4.11.3 Authorised increase in the final contract amount 4.11.4 Invoicing
	4.12 Occupational health and safety	
	4.13 Departures from procedures	

Table 2 Gates, stages and end of stage deliverables in the Infrastructure Gateway System

Gate No	Information (deliverable) provided for a decision to be made at a gate / conclude a stage	Stage	
		No	Description
1	Infrastructure plan which identifies long-term needs and links prioritised needs to a forecasted budget for the next few years	1	Infrastructure planning
2	Construction procurement strategy for implementing the infrastructure plan in the medium term	2	Procurement planning
3	Strategic brief setting out the package information for a package	3	Package planning
4	Concept report setting out the integrated concept for the package	4	Package definition
5	Design development report setting out the integrated developed design for the package*	5	Design development
6A	Production information which enables construction or the production of manufacturing and installation*	6	Design documentation
6B	Manufacture, fabrication and construction information for construction*		
7	Works completed in accordance with requirements	7	Works
8	Works handed over to user complete with record information	8	Hand over
9A	Updated asset register	9	Close out
9B	Completed contract or package order		

*Stages 5 and 6 are not needed in the maintenance of infrastructure

Board, including SANS 294 and SANS 1403, and practice notes and standardised procurement issued by the Board, enable the Standard for Uniformity in Construction Procurement to be implemented. These documents, together with the Standard for Uniformity in Construction Procurement, have now been incorporated into an eight-part series of international standards (ISO 10845).

An organisation's construction procurement system can be put in place by capturing system requirements in a single document covering policies, processes, procedures and methods framed around the use of standards and standard forms of contract and the South African legislative framework. Such a document should deal with the topics and sub-topics outlined in Table 1.

INFRASTRUCTURE GATEWAY SYSTEM (IGS)

The CIDB Infrastructure Gateway System (IGS) provides a number of control points (gates) in projects relating to 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, provides assurance that a project involving the delivery or 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 Table 2.

The CIDB IGS permits the undertaking of groups of activities in parallel or series, and results at the end of each stage in a predetermined deliverable (a tangible, verifiable work product) and a structured decision point, which enables decisions to be made to determine if the project should continue to its next stage with or without any adjustments between what was planned and what is to be delivered.

The CIDB has developed a *Standard for the Delivery and Maintenance of Infrastructure using a Gateway System* which establishes the work flow associated with the system and enables responsibilities to be allocated.

A key innovation in the CIDB IGS is the introduction of the procurement planning stage which requires that a construction procurement strategy be developed for the implementation of an infrastructure plan at a portfolio level (see Figure 3).

Strategy in the delivery and maintenance of construction works may be considered to be the skilful planning and managing of the delivery process. It involves a carefully devised plan of action which needs to be implemented. It is all about taking appropriate decisions in relation to available options and prevailing circumstances in order to achieve optimal outcomes. Construction procurement strategy is the combination of the delivery management strategy (decisions relating to the meeting of needs through a Public Private Partnership, an implementing agent, another organ of state's framework agreement, outsourcing or own resources and the packaging of projects), contracting arrangements and procurement arrangements for a particular procurement. 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.

Such strategies:

- can significantly reduce the number of contractual relationships that an organisation needs to enter into to manageable levels, commensurate with their staff compliment, without compromising empowerment objectives while introducing efficiencies in the delivery process
- enable long-term collaborative relationships to be entered into which can:
  - lead to efficiencies and improvements over time in terms of project costs, time for delivery, quality of construction, health and safety performance, environmental performance and key performance indicators (KPIs) relating to broad based black economic empowerment, contractor development, job creation and poverty alleviation
  - provide flexible construction capacity to undertake projects over a term which ensures that allocated budgets for a programme of works are spent
- enable early contractor involvement to integrate projects in order to achieve higher value and less waste
- facilitate a higher degree of project integration, innovation and value-based contractual arrangements that reward performance through non-adversarial collaborative relationships.

The CIDB, in collaboration with National Treasury, has developed Practice Guide No 2, Construction Procurement Strategy, as part of the IDM Toolkit. This guide provides a step by step procedure with decision trees to facilitate the development of a construction procurement strategy in response to a set of organisational objectives.

INFRASTRUCTURE DELIVERY MANAGEMENT SYSTEM (IDMS)

The IDMS, which was developed by the CIDB in collaboration with National Treasury and others, forms the backbone for the management of the delivery and maintenance of infrastructure, as illustrated in Figure 4. The CIDB / National Treasury IDM Toolkit 2010 provides a documented body of knowledge and set of processes that represent generally recognised best practice in the delivery management of infrastructure.

The IDMS, which encompasses the Infrastructure Gateway System and the Construction Procurement System, is structured in such a way as to embed government's budgeting and expenditure cycles into the planning, delivery and operation and maintenance of infrastructure. These cycles are embedded into the Toolkit's three key delivery processes, namely (see Figure 4):

- **Portfolio Management** – the iterative processes of identifying objectives, planning and intelligently grouping

projects into infrastructure programmes and monitoring and controlling the roll-out of these programmes or projects

- **Project Management** – implementing the projects identified in the planning processes
- **Operation and Maintenance** – where assets are operated, maintained and ultimately disposed of.

Two important documents that are developed annually to manage and resource delivery from an organisation's point of view are the **Infrastructure Programme Management Plan (IPMP)** and the **Infrastructure Programme Implementation Plan (IPIP)**.

The **IPMP**, which strengthens client oversight and needs to be aligned with the adopted construction procurement strategy, should as a minimum:

- identify the objectives of each programme
- identify the scope and time schedule of the programme of projects
- provide details of the projects budgeted for implementation in the Medium Term Expenditure Framework (MTEF) period (three-year planning horizon)
- outline the construction procurement strategy (execution strategy)
- identify and describe the client support structures which need to be consulted with during, or who need to participate in, aspects of the delivery cycle
- provide a time management plan for the programme, i.e. the baseline against which progress towards the attainment of milestone target dates can be measured
- provide the projected budget and cash flows (cost plan for the programme) which will enable planned and actual expenditure to be compared in different categories of spend, and revisions to the budget to be approved, and multiple project budgets to be managed and rolled up to infrastructure programme level
- document the key success factors and the key performance indicators which need to be measured, monitored and evaluated
- identify the major risks and how such risks are to be mitigated/managed (risk assessment and management plan)
- indicate how client quality requirements and expectations are to be met
- document a communication plan which determines the lines of communication and includes, as necessary, the following key activities:
  - Communications Planning – determining the information and communications needs of the stakeholders, i.e. who needs what information, when will they need it, and how will it be given to them
  - Information Distribution – making needed information available to project stakeholders in a timely manner
  - Performance Reporting – collecting and disseminating performance information, including status reporting, progress measurement, and forecasting
  - Administrative Closure – generating, gathering and disseminating information to formalise phase or project completion
- identify quality management requirements.

The IPMP, which is prepared by the 'planner', indicates the allocation of the MTEF budget to the projects to be implemented over the MTEF period. As such it 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**, on the other hand, should as a minimum:

- provide for each package of which the concept report has been accepted:
  - a high level summary of the most recent package information (project execution plan (PEP))
  - the assigned resources for implementation and responsibilities
  - the current cash flow forecast
  - the milestone dates (key deliverables) for implementation of each project
  - key performance indicators, targets and the means of quantification/measurement

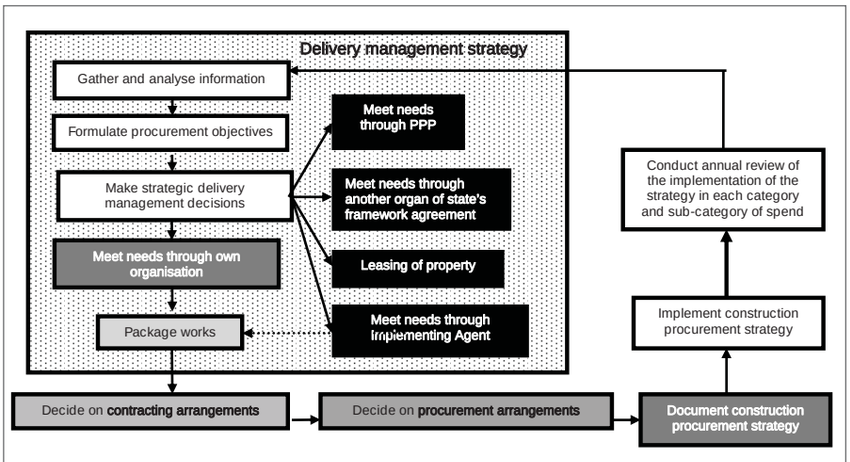


Figure 3: The development of a Construction Procurement Strategy for a portfolio of projects

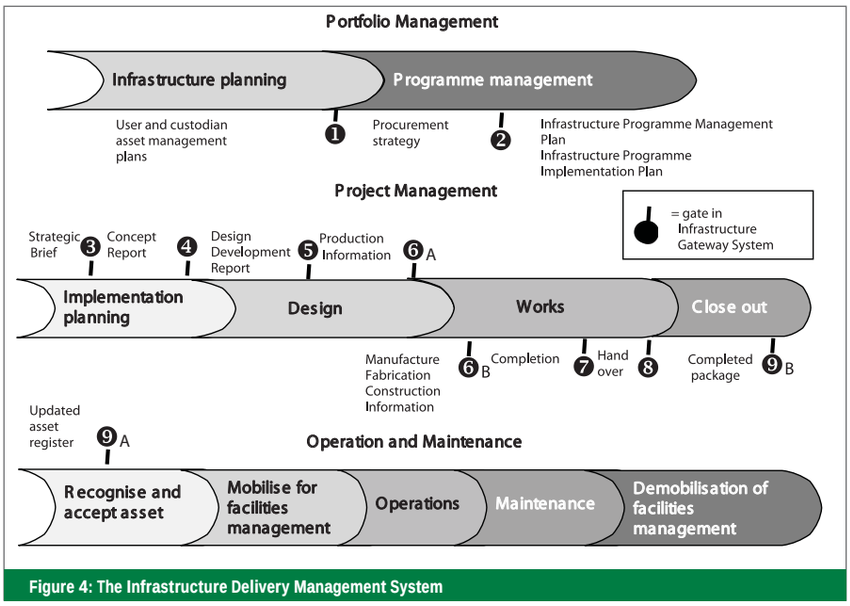


Figure 4: The Infrastructure Delivery Management System

- the controls and measures which will address health, safety, environmental and other project risks
- outline requirements for projects and packages that have not progressed beyond stage 4 of the IGS
- enable a financial report to be generated which:
  - lists the packages associated with a programme or project which have been finalised during the last two years preceding the MTEF period together with actual expenditure
  - shows the following for packages being implemented during each year of the MTEF period:
    - budget for the year
    - actual expenditure to date
    - remaining budget for the year
    - forecast expenditure for the remainder of the year
    - forecast over/under expenditure for the year
  - indicates expenditure in relation to projects which have not progressed beyond stage 4
  - enables 'Actual versus Planned' expenditure and time lines to be compared at a package or programme/project level.

The IPIP is prepared by the 'implementer' and focuses on managing package scope, time and cost.

THE FRAMEWORK FOR DELIVERY MANAGEMENT

The IDMS establishes the processes, procedures and methods which need to be applied in the delivery of infrastructure and maintenance projects and presupposes that an organisation has in place a well-developed construction procurement system. It needs to be institutionalised and operationalised within an organisation, failing which it will remain as a useful tool and set of best practices which should be employed – a 'nice to have'.

In order for it to become an integral part of an organisation, the following questions need to be answered:

- What are the different responsibilities of the person commissioning the work and the person responsible for implementing the works at each gate?
- What are the primary design and delivery activities and responsibilities?
- How are KPIs/progress monitored and reported on?
- How is quality assured in the delivery process?
- How are major capital works evaluated prior to making an investment decision?
- What are the project and programme arrangements?
- How are contracts administered and how is payment effected?
- How are occupational health and environmental safety managed?

The answers to these questions need to be documented in an organisation's delivery management framework, which not only establishes the planning, design and delivery management processes, procedures and methods, but also sets out the:

- services required to develop an end of stage deliverable
- minimum requirements for the content of end of stage deliverables
- governance arrangements to manage and control the processes
- organisational decisions which deal with issues such as assessing the quality of the end of stage deliverables and reporting on progress and key performance indicators.

This document, read together with an organisation's Infrastructure Programme Management Plans (IPMPs) and Infrastructure Programme Implementation Plans (IPIPs) for portfolios of projects across a medium-term expenditure framework and documented construction procurement system, will enable an organisation to develop its organograms, staffing requirements, training programmes, monitoring and reporting systems and its approach to audits.

Strategy in the delivery and maintenance of construction works may be considered to be the skilful planning and managing of the delivery process. It involves a carefully devised plan of action which needs to be implemented. It is all about taking appropriate decisions in relation to available options and prevailing circumstances in order to achieve optimal outcomes. Construction procurement strategy is the combination of the delivery management strategy, contracting arrangements and procurement arrangements for a particular procurement. An outcome of this process is the identification of packages and contracts for professional services

ACKNOWLEDGEMENTS

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Information on the IDMS, the IGS and construction procurement may be found on the CIDB website: www.cidb.org.za/procurement/delivery/infrastructure_improvement/default.aspx