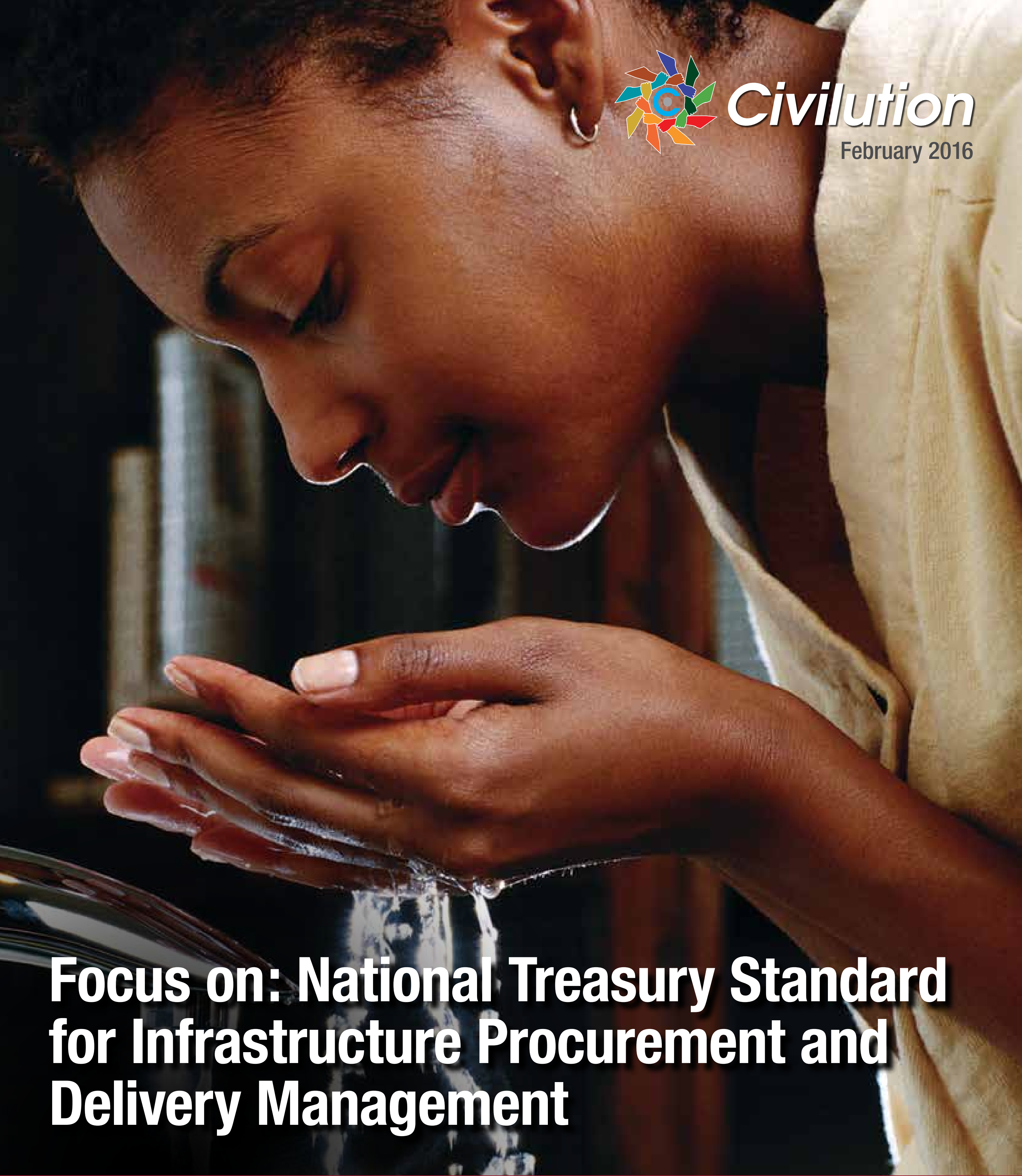

Civilution

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Focus on: National Treasury Standard for Infrastructure Procurement and Delivery Management

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Value for money in infrastructure delivery

The *Standard for Infrastructure Procurement and Delivery Management* defines value for money as “the optimal use of resources to achieve intended outcomes”. The control framework for the planning, design and execution of infrastructure projects, the tracking of projects, and the monitoring of performance provided in this standard is, amongst other things, designed to ensure that any infrastructure acquired or to be acquired offers value for money. A focus of the gateway reviews for major capital projects is on value for money. The concept of and issues surrounding value for money need to be understood, as well as the threats and opportunities associated therewith.

THE CONCEPT OF VALUE FOR MONEY

Public infrastructure that is acquired needs to be financially, economically and technically viable, and should offer value for money over its life cycle. A key question that is most often asked whenever new public infrastructure is contemplated or delivered, is “Does the investment provide value for money?”

Value for money may be regarded as the optimal use of resources to achieve intended outcomes. Underlying value for money is an explicit commitment to ensure that the best results possible are obtained from the money spent, or the maximum benefit is derived from the resources available. It is a means for developing a better understanding (and better articulation) of costs and results so that more informed, evidence-based choices can be made.

Value for money needs to be assessed during the delivery cycle using the so-called three “E's” – *economy*, *efficiency* and *effectiveness* at the end of the planning, implementation and close-out phases of a project, respectively (see Figure 1). An overarching fourth ‘E’ also needs to be considered when delivering infrastructure, namely *equity*.

The critical starting point in delivering value for money through infrastructure projects is, in the first instance, to align such projects with strategic objectives, priorities, budgets and plans, and thereafter, during the planning phase, to clearly define objectives and expected outcomes, as well as parameters such as the time lines, cost and levels of uncertainty. This frames the value-for-money proposition that needs to be implemented at the point in time that a decision is taken to proceed with a project, i.e. it establishes *economy* and identifies *equity*. The end point is to compare the projected outcomes against the actual outcomes, i.e. to confirm the *effectiveness* of the project in delivering value for money.

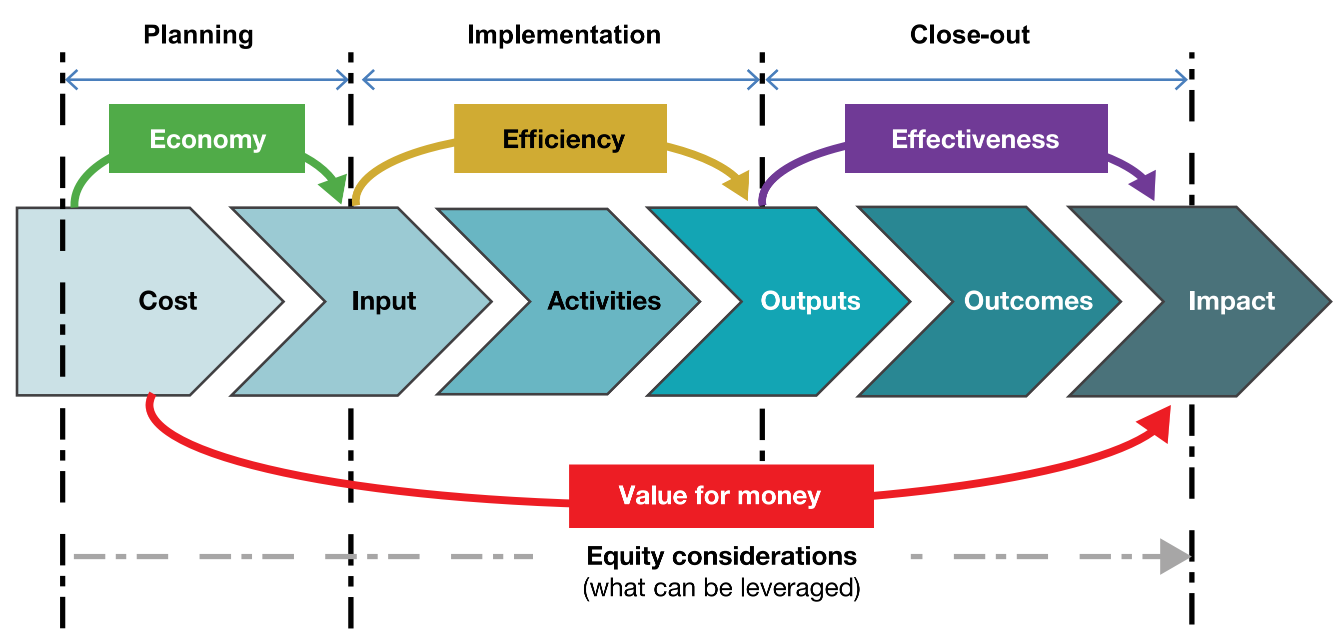
Implementation sits between *economy* and *effectiveness* in the results chain framework. It needs to be executed *efficiently* in order to minimise time delays, scope creep and unproductive costs, and to mitigate the effects of uncertainty on objectives so as to maintain the value-for-money proposition formulated at the outset of the project. This necessitates that the implementer of an infrastructure project exercises due care and reasonableness during implementation. Failure to do so may result in substandard or unacceptable performance, which results in a gap between intended and achieved outcomes. This gap puts value for money for a project at risk and may result in unintended consequences, such as community instability and unrest.

DELIVERING VALUE FOR MONEY IN INFRASTRUCTURE PROJECTS

The delivery of infrastructure needs to be managed and controlled in a logical, methodical and auditable manner. The starting point in the development of any delivery management system is to identify the information which needs to be developed and accepted by the client or implementer at a particular point in the delivery process to enable a project to be advanced, i.e. at a control point (or gate). The stages in the delivery of construction works can then be defined as the activities that need to take place between such points. These stages enable the workflow (sequence of connected activities) towards the attainment of an end-of-stage deliverable to be developed, and culminate in gates (control points) which can be used to provide assurance that the proposed works remain within agreed mandates, align with the conceived purpose, and can progress successfully from one stage to the next. The results-chain framework illustrated in Figure 1 needs to be linked to the stages of infrastructure delivery. Figure 2 links the three basic "E's" associated with value for money to the stages of the life cycle for the delivery of infrastructure embedded in the *Standard for Infrastructure Procurement and Delivery Management.*

The critical starting point in delivering value for money through projects is to screen and select projects during the project initiation stage which are aligned with strategic needs or business opportunities (see Stage 0 in Figure 2). Objectives and expected outcomes for given inputs, as well as parameters such as the time lines, cost and levels of uncertainty need to be formulated and documented at the end of the planning phase (Stage 4). This frames the value-for-money proposition that needs to be implemented at the point in time that a decision is taken to proceed with the implementation of a project. It establishes *economy* and identifies opportunities for *equity* when design concepts or solutions have been sufficiently developed to establish the feasibility of the works, or to select a particular conceptual approach to pursue. It is also the point where the scope of a project is frozen. Should the works not prove to be viable as conceptualised (e.g. insufficient budget, unacceptable risk profile, geotechnical / environmental / community constraints, poor return on investment, etc), the project is either consciously modified in order to satisfy *economy* considerations before proceeding with implementation or is terminated as indicated in Figure 2.

During the close-out of a project (Stage 9) the projected outcomes are compared against the actual outcomes. This confirms the *effectiveness* of the project in delivering value for money. This typically involves the comparing of the scope, schedule and cost plan, and, where relevant, the performance as documented at the start and the end of the implementation phases respectively. Value for money will occur when what is achieved equals or exceeds what was expected. Any deficit between what was planned and what was achieved puts value for money for a project at risk. An assumption can, however, be made that if the implementer exercises due care and reasonableness during implementation, value for money will be achieved. Put differently, if due care and reasonableness are exercised during implementation, and what is achieved is nevertheless less than what was expected, the difference lies not in the efficiency of implementation, but in the inherent project risks materialising, or shortcomings in framing the value-for-money proposition at the start of the project. It is a well-researched fact that risk is inherent in all projects, and not all risks can be accurately forecasted or controlled during project planning and implementation.



Cost	Sum of money required to fund the intervention.
Input	Inputs cover all the materially significant financial, human and material resources used for a development intervention.
Activities	Activities are used to deliver outputs.
Outputs	Outputs relate to products, capital assets and services which result from a development intervention. Outputs are limited to the specific, direct deliverable of the intervention.
Outcomes	Outcomes are the likely or realised short-term/medium-term effects of the outputs of any intervention. Outcomes are used to identify (a) what will change, (b) who will benefit and (c) how it will contribute to poverty reduction and/or the Millennium Development Goals.
Impact	Longer-term effects are produced, directly or indirectly, by a development intervention. Impact refers to higher level identified achievements that the intervention will contribute towards.

Figure 1: Conceptual framework for value for money

REASONS FOR INFRASTRUCTURE PROJECTS FAILING TO DELIVER VALUE FOR MONEY

Planning phase

The value-for-money proposition at the time that a decision is taken to proceed with the implementation of an infrastructure project is based on sets of assumptions and the available data. It is therefore important to understand the context within which the value-for-money proposition is established, particularly that relating to cost.

The degree of project definition, as measured by the percentage of design completed at the end of Stage 4, can be estimated from the fee apportionments for stages contained in the guideline fees, such as those published by the South African councils for the architectural and engineering professions and the Royal Architectural Institute of Canada. It is somewhere between 12% and 40%, depending upon the nature of the works that are being designed and the level of effort and detail put into the end of Stage 4 deliverables, as some of the work which is normally included in the Stage 5 deliverables may

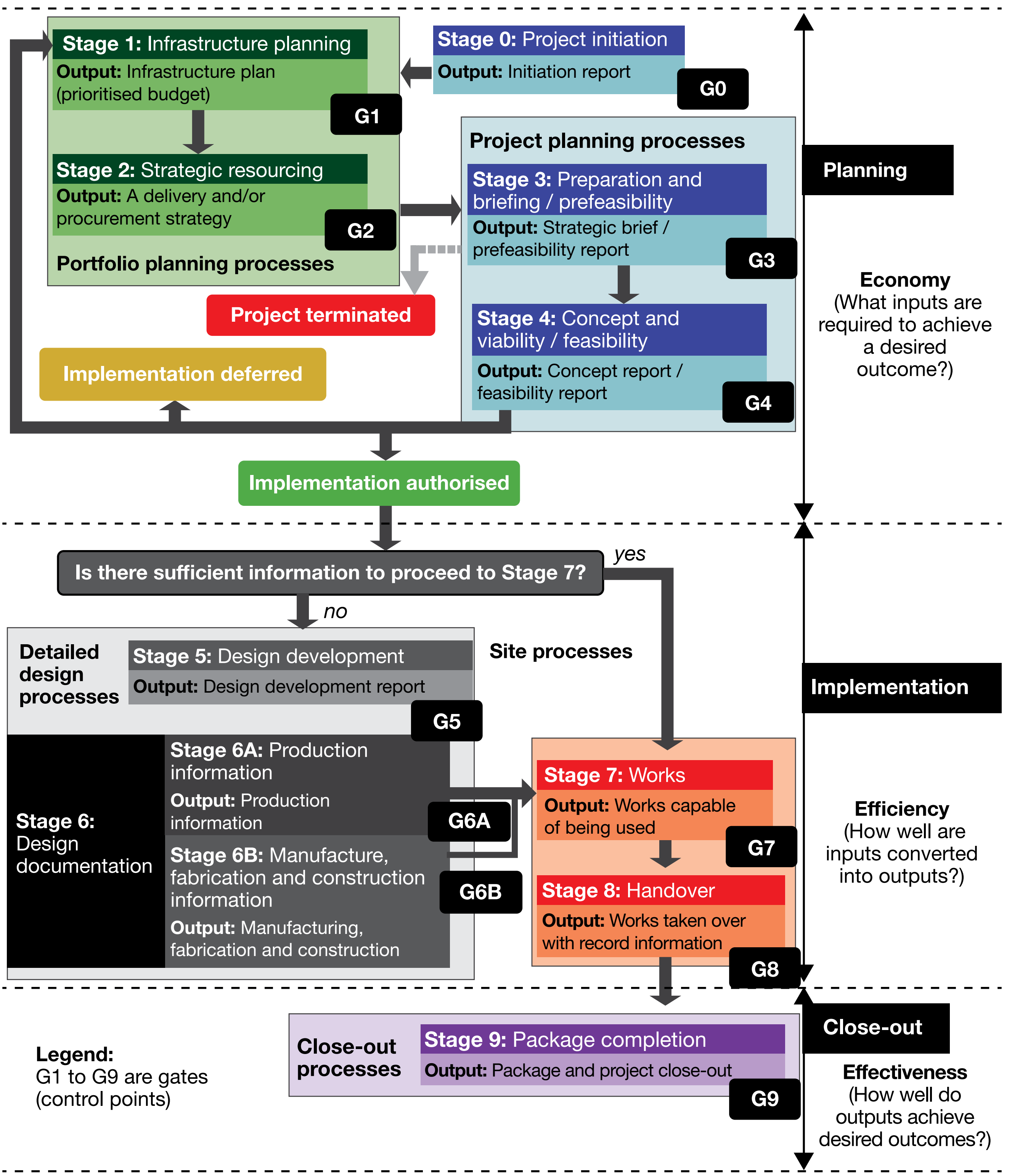


Figure 2: Control framework for infrastructure delivery management

be included in the Stage 4 deliverables. As an illustrative example, the United States Department of Energy uses the classification of estimates indicated in Table 1 to enable the quality of the cost estimate to be appropriately considered through the evolution of a project. Classes 3, 2 and 1 estimates typically occur towards the end of Stages 4, 5 and 6 respectively. As a result, the decision to proceed with a project may be based on a Class 3 estimate with a -20% to +30% accuracy where the degree of project definition is between 10% and 40%.

The value-for-money proposition upon which the *economy* of a project is made at the end of Stage 4 should be viewed with some caution, as it may be tainted by:

- optimism bias – the human mind's cognitive bias in presenting the future in a positive light; and
- strategic misrepresentation – behaviour that deliberately underestimates costs and overestimates benefits for strategic advantage, usually in response to incentives during the budget process.

The HM Treasury's *The Green Book: Appraisal and Evaluation in Central Government* (2003) defines optimism bias as "the demonstrated systematic tendency for appraisers to be over-optimistic about key project parameters, including capital costs, operating costs, works duration and benefits delivery". This United Kingdom publication introduces an explicit adjustment procedure to redress the systematic optimism ("optimism bias") that historically has afflicted the appraisal process of projects. Optimism bias can arise in relation to capital costs, works duration, operating costs and under-delivery of benefits. According to *The Green Book*, the two main causes of optimism bias in estimates of capital costs are:

- poor definition of the scope and objectives of projects in the business case, due to poor identification of stakeholder requirements, resulting in the omission of costs during project costing; and
- poor management of projects during implementation, so that schedules are not adhered to and risks are not mitigated.

Explicit adjustments for bias need to be made in the form of increasing estimates of the costs, and decreasing (and delaying the receipt of) estimated benefits. Sensitivity analysis needs to be used to test assumptions about operating costs and expected benefits. Adjustments should be empirically based (e.g. using data from past projects or similar projects elsewhere), and adjusted for the unique characteristics of the project in hand. Table 2 provides adjustment percentages recommended in a supplementary *Green Book* guidance (2011) for generic project categories that should be used in the absence of more robust evidence.

Implementation phase

Implementation sits between the bookends of *economy* and *effectiveness* in the results chain framework shown in Figure 1, i.e. between Stages 4 and 9 (Figure 2). It needs to be executed *efficiently* so as to maintain the value-for-money proposition formulated at the outset of the project.

Optimism bias and strategic misrepresentation are in the main confined to the planning (*economy*) stages of a project, which end with a decision being made to proceed with a project, and relate to the quality of the information upon which a decision is made. The key question that begs asking is what proactive action can be taken during implementation (*efficiency*) to minimise any gaps between achieved and projected outcomes, irrespective of whether or not optimism bias and strategic misrepresentation are present at the time that a decision is taken to implement a project.

Strategy in infrastructure delivery may be considered as the skilful planning and management 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. Portfolio, programme and project management arrangements for the delivery of projects can be effectively used to manage risk (foreseen and unforeseen), stakeholder interference and scope creep, all of which, if unchecked, inevitably lead to what was not planned

Table 1: Generic cost estimate classifications and primary characteristics

Primary characteristic		Secondary characteristic		
Estimate class	**Degree of project definition (expressed as % of complete definition)**	**Typical purpose of estimate**	**Methodology**	**Expected accuracy range (typical variation in low and high ranges)***
Class 5	0% to 2%	Concept screening	Capacity-factored parametric models judgement or analogy	-20% to -50% +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment-factored or parametric models	-15% to -30% +20% to +50%
Class 3	10% to 40%	Budget, authorisation or control	Semi-detailed unit costs with assembly-level line items	-10% to -20% +10% to +30%
Class 2	30% to 70%	Control or bid/tender	Detailed unit costs with forced detailed take-off	-5% to -15% +5% to +20%
Class 1	70% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	-3% to -10% +3% to +15%

* The state of process technology and the availability of applicable reference cost data affect the range markedly. The + or - values represent the typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for a given scope.

Table 2: HM Treasury recommended adjustment ranges for optimism bias				
Project type	Optimism bias (%)			
	Works duration		Capital expenditure	
	Upper	Lower	Upper	Lower
Standard building projects are those which involve the construction of buildings not requiring special design considerations.	4	1	24	2
Non-standard building projects are those which involve the construction of buildings requiring special design considerations due to space constraints, complicated site characteristics, specialist innovative buildings or unusual output specifications.	39	2	51	4
Standard civil engineering projects are those that involve the construction of facilities, in addition to buildings, not requiring special design considerations.	20	1	44	3
Non-standard civil engineering projects are those that involve the construction of facilities, in addition to buildings, requiring special design considerations due to space constraints or unusual output specifications.	25	3	66	6

Table 3: Culture changes which are conducive to improving project outcomes	
From	To
Master-servant relationship of adversity (them and us).	Collaboration towards shared goals (integrated project team approach).
Fragmentation of design and construct.	Integration of design and construct through early contractor involvement.
Constructability and cost model determined by the design team and quantity surveyor / cost consultant only.	Constructability and cost model developed with contractor's insights.
Short-term hit-and-run relationships focused on one-sided gain.	Long-term relationships focused on maximising efficiency and shared value.
Risks are allowed to take their course.	Active risk management and mitigation.
Develop the project in response to a stakeholder wish list.	Deliver the optimal project within the budget available.
Pay-as-you-go delivery culture.	Discipline of continuous budget control.
Pay for what is designed.	Deliver infrastructure within an agreed budget.
Rigid, bespoke, ill-defined and disjointed procurement system.	Flexible, predictable, integrated, documented and auditable procurement system.
Poorly structured procurement documents based on bespoke or local standards and forms of contract with reliance placed on local knowledge.	Structured procurement documents based on international/national standards and forms of contract with minimal customisation/amendments, and clear and unambiguous requirements.
Meetings focused on the past – what has been done, who is responsible, claims, etc.	Meetings focused on how the project can be finished within the time and budget available.
Project management focused on contract procedures and paper trails.	Decisions converge on the achievement of the client's objectives.
Standard delivery stages prescribe the contracting arrangements and are unrelated to a portfolio of projects.	Delivery is managed and controlled through stages which permit the full range of contracting arrangements and commence at a portfolio level.
Ill-defined end-of-stage deliverables and acceptance procedures.	Well-defined end-of-stage deliverables and acceptance procedures which enable informed decisions to be made.
Design and construction developed in isolation from operation and asset management considerations.	Design and construction aligned with operation and asset management requirements.
Procurement strategy focused on selection of form of contract, as all other choices are predetermined.	Selected packaging, contracting, pricing and targeting strategy and procurement procedure aligned with project objectives.
One project one contract.	Works packaged appropriately to achieve objectives and efficiencies.
Project delivery takes place within predetermined parameters without any conscious thought to objectives.	Project delivery on documented primary and secondary (developmental) objectives takes place in a measureable and quantifiable manner.

to happen. Governance linked to suitable control frameworks for infrastructure procurement and delivery management can make a significant contribution to the effectiveness of project implementation.

Delivery strategies including the use of another organ of state to implement a project can, depending on how it is structured, impact negatively or positively on a project.

The leadership qualities, experience, technical understanding and commercial competence of those responsible for directing the implementation of projects and programmes on behalf of a client can have a significant impact on project outcomes. This is particularly true as the project scale and complexity increase.

Procurement strategy reflects the choices made in determining what is to be delivered through a particular contract, the procurement and contracting arrangements, and how secondary (or developmental) procurement objectives are to be promoted during the implementation phase of an infrastructure project. Such strategy enables risks to be allocated to the party that is best able to manage it, provides performance incentives, enables fragmentation in design to be addressed (thereby providing higher value and less waste), and can reduce the number of relationships which have to be managed, which in turn can overcome capacity constraints.

Procurement tactics are required to implement procurement strategies. Such tactics relate to the setting up of the procurement documents to solicit tender offers and to enter into contracts, i.e. the formulation of submission data, tender data, contract data, and the pricing and scope of work associated with a contract or order issued in terms of a framework contract. Choices are informed by a number of considerations, such as the selection of a contractor who is most likely to deliver best value through the performance of the contract, life cycle costs, the availability of spares, operation and maintenance requirements, the nature of the desired relationship with the contractor, the manner in which delays and disruptions are to be managed, the allocation of specific risks to the party that is best able to bear it, risk mitigation measures, development procurement policy objectives, etc.

Procurement strategy and tactics accordingly have the potential to contribute to *efficiency* during implementation, and to reduce the gap between achieved and projected outcomes.

The selection of a form of contract can also potentially impact on project outcomes. Forms of contract which provide open-book approaches to the costing of changes, due to the occurrence of risk events, foster collaborative working relationships and are most likely to deliver value for money, based on the belief that collaboration and teamwork across the whole supply chain:

- optimise the likely project outcomes;
- provide pricing arrangements that align payments to results;
- reflect a more balanced sharing of performance risk; and
- deal with delays and disruptions efficiently and effectively.

Inefficiencies during implementation can result from:

- the application of supply chain management (SCM) thinking associated with that for general goods and services;
- poor SCM policies which do not place the decision-making in the hands of those best able to make decisions and who are motivated to do so;
- the allocation of responsibilities to perform functions to those who do not have the skills set to function effectively; and
- poor procurement skills amongst those responsible for conceptualising and executing procurement processes.

Efficiencies during implementation can be facilitated through the culture changes outlined in Table 3.

DESIGNING AN INFRASTRUCTURE PROCUREMENT AND DELIVERY MANAGEMENT SYSTEM WHICH DELIVERS VALUE FOR MONEY

A review of some of the pertinent literature suggests that project outcomes can be improved by embracing the following principles in the design of an infrastructure procurement and delivery management system:

- Adopt a strategic approach to procurement and delivery management above the project level.
- Establish trust-based engagement of stakeholders throughout the process to avoid suboptimal solutions and unnecessary delays.
- Put in place governance systems which incorporate oversight functions to assess aspects of value for money throughout the project cycle in a systematic manner.
- Put in place rigorous project selection processes.
- Differentiate between the different types of procurement which pose different challenges and require different skills sets.
- Standardise delivery in a manner which enables risks to be proactively managed and responsibilities to be clearly established.
- Build relationships of trust and understanding with the private sector.
- Put in place reliable data-gathering systems on which to base day-to-day oversight and long-term planning.
- Develop strong public-sector capabilities across the value chain of planning, delivery and operations.
- Increase transparency through the disclosure of information which is subjected to internal and external scrutiny.

The National Treasury *Standard for Infrastructure Procurement and Delivery Management* is either designed around the abovementioned principles or facilitates their implementation.

NOTE

Further insights and information can be obtained from:

Flyvberg, B, Bruzelius, N & Rothengatter, W 2003. *Megaprojects and risk: An anatomy of ambition.* Cambridge: Cambridge University Press.

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