



DPC: 24/30470966 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Introduction

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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



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Construction project governance — Guidance on delivery management

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC ^[59] *[Buildings and civil engineering works]*, Subcommittee SC 18, *[Construction procurement]*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

ISO 21502 provides guidance on concepts and practices for project management that are important for and have an impact on a project's successful delivery. It is applicable to any public or private organization, as well as any type of project, regardless of purpose, delivery approaches, life cycle model used, complexity, size, cost or duration. It provides a general foundation and generic guidance on concepts and practices applicable to all types of projects which may be located within any industry.

Industry specific adaptations of ISO 21502 are necessary for construction works projects. Such adaptations which are necessary to accommodate the specificities of the construction industry include:

- the need to simultaneously address the geography, site conditions, communities, physical environments, existing construction works, as well as a wide range of stakeholder requirements, client's value proposition and project constraints;
- an ever changing, complex environment, often with a high degree of known and unknown risks;
- the scale and complexity of projects require high-impact evidence-based decision making with very material implications for cost and outcomes;
- the frequent one-of-a-kind product which is delivered on a particular site rather than mass-produced items delivered in a factory environment;
- the frequent integration of built environment professions and engineering disciplines in the design and delivery processes;
- the delivery of a project in phases, which provides an opportunity to review and refine the project design and implementation strategy, as well as validate the investment intention;
- the industry being almost entirely based on a competitive market environment for project cost, schedule and performance delivery;
- the nature of the contracting construction businesses which are paid for work in progress which can become a conduit for payment to those who do the actual work;
- projects being delivered through multiple contracts where:
 - the individual pieces in a single project have no value without every other piece being successfully completed; and
 - requirements (specifications), availability of resources (supply-side issues) and the context (how and why projects take place) can change between project inception and completion, particularly where there is an appreciable time between these milestones;
- the involvement of different combinations of funders, professionals, site conditions, materials and technologies and general contractors, specialist contractors, skills and workforces on each project;
- the development or utilization of land;
- the magnitude of individual transactions which can form a major portion of the annual turnover or assets of organizations and stakeholders involved in the process; and
- construction works with a few exceptions such as certain types of housing is acquired to support social and economic activities and as such form inputs into broader projects.

Furthermore, the buyer-supplier relationship differs from non-construction works projects in that the buying or client function requires significant built environment professional capability throughout the process of conceptualisation to implementation and maintenance i.e., through the full life-cycle of the project.

Construction works projects are necessary to support the strategic and business objectives of client organisations according to their purpose and values. Such projects need to be delivered within the

client's organisational governance framework i.e., the strategies, policies, decision-making structures and accountabilities through which the client organisation's governance arrangements operate. Client organisational governing bodies need to hold management to account to ensure that construction works projects embrace the culture, norms and practices of the organization and align with its purpose. They need to make decisions informed by credible information and reliable data, stakeholders, ethical and societal expectations, compliance obligations, open and honest reporting and natural environment limitations and impacts. ISO 37000 provides guidance in this regard.

Construction works projects are delivered through a supply chain. Contracts bind the participants in the supply chain. The delivery of construction works projects embraces:

- a “buying” or client delivery management function focusing on client delivery management practices (plan, specify, procure and oversee delivery); and
- a “supply” or delivery function focussing on the management and integration of the resources required to deliver the project.

The project management function associated with projects coordinates activities to direct, integrate and control the accomplishment of agreed objectives in support of the supply function. The delivery management function, on the other hand, focuses on knowledgeable leadership, consistent governance and systematic administration of procurement, contracts and project finances.

Client procurement and delivery management practices (the client buying functions) are central to the performance of the supply chain which delivers construction works projects. Such practices have a direct impact on the realisation of the client's value proposition for the project i.e., the promise of measurable benefits. Delivery management is required to transform the value proposition associated with a business case into project outcomes.

ISO 10845 focuses on the characteristics of procurement processes, methods and procedures and the detail relating thereto, concentrating on the evaluation and award phase of procurement. There are several options relating to how construction works are funded and how design and interface management responsibilities are allocated. There are also options relating to the different types of contracts that may be entered into during the delivery cycle of a project, how contractors and suppliers are to be remunerated, how secondary objectives are to be promoted through a contract and how the market is to be approached to solicit tender offers. Such choices impact upon project outcomes. ISO 22058 provides guidance on the development of procurement strategy and the procurement tactics which are necessary to effectively implement a procurement strategy.

This document focuses on delivery management and is of particular relevance to clients that need to engage regularly in the delivery of construction projects. It provides guidance on the client organization's function to plan, specify, procure and oversee the delivery of construction works projects, enabling the business case to be converted into project outcomes.

[Annex A](#) describes the core systems associated with the delivery of construction works projects, namely a planning and budgeting, an asset management, a delivery management and a procurement system. It also indicates the forward and backward linkages between such systems. [Annex B](#) provides a control framework which enables project delivery risks to be appropriately and proactively managed and renders the project delivery system capable of being audited. [Annex C](#) provides guidance on the specifying of requirements.

Construction project governance — Guidance on delivery management

1 Scope

This document provides guidance on:

- a) the role of the client in the effective and efficient delivery of construction projects; and
- b) delivery management practices which enable the client's business case to be transformed into project outcomes in a manner which consistently realizes value for money.

This document may be applied by the private sector, the public sector or community organizations.

Note 1 Delivery management focuses on the client's practices in delivering the client's value aspirations for a construction works project whereas project management focuses on practices to accomplish agreed objectives.

Note 2 A client can be a project owner or an entity within a supply chain which contracts for goods and services or any combination thereof. This standard applies primarily to clients who have a continuous flow of or pipeline of projects. Nevertheless much of the guidance can be adapted for use by occasional clients who have construction works projects delivered through trusted delivery teams.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 asset management plan

documented information that specifies the activities, resources and timescales required for an individual asset or a grouping of assets, to achieve the organization's asset management objectives

Note 1 to entry: The grouping of assets may be by asset type, asset class, asset system or asset portfolio.

Note 2 to entry: An asset management plan is derived from the strategic asset management plan.

Note 3 to entry: An asset management plan may be contained in, or may be a subsidiary plan of, the strategic asset management plan.

[SOURCE: ISO 55000:2014, 3.3.3]

3.2 brief

document that states the requirements for a project

[SOURCE: ISO 6707-2:2017, 3.1.8]

3.3

business case

documented justification to support decision making about the commitment to a project

Note 1 to entry: A business case summarizes the scope, benefits, costs and risks of a proposed solution to a business need

[SOURCE: ISO 21500:2018, 3.2, modified — "programme or portfolio" at the end of the definition has been removed]

3.4

client

person or organization initiating and financing a project and approving the *brief* (3.2)

[SOURCE: ISO 6707-2:2017, 3.2.8.2]

3.5

client delivery management team

individuals or entities who, through coordinated actions, are responsible for performing the *delivery management* (3.8) functions associated with *project delivery* (3.13)

3.6

construction works

everything that is constructed or results from construction operations

[SOURCE: ISO 6707-1:2020, 3.1.1.1, modified — The US preferred term and notes to entry have been removed.]

3.7

contractor

person or *organisation* (3.8) that undertakes *construction work* in accordance with a contract

[SOURCE: ISO 6707-2:2017, 3.8.6]

3.8

delivery management

the critical leadership role played by a knowledgeable client to plan, specify, procure and oversee the delivery of construction works projects including knowledgeable leadership, consistent governance and systematic administration of procurement, contracts and project finances.

3.9

feasibility study

evaluation of a proposed *project*, the practicability of its achievement, potential risks and the design, financial, economic, social and environmental implications

[SOURCE: ISO 6707-2:2017, 3.3.16 – potential risks added]

3.10

organization

person or group of people that has its own function with responsibilities, authorities and relationships to achieve its objectives

[SOURCE: ISO 55000:2014, 3.1.13]

3.11

performance

ability to fulfil required functions under intended use conditions, behaviour when in use or impact on economic conditions, the environment, society or quality of life.

3.12

project management

coordinated activities to direct and control the accomplishment of agreed objectives

[SOURCE: ISO 21502:2020, 3.24]

3.13

procurement

process which creates, manages and fulfils contracts relating to the provision of goods, services and construction works or disposals, or any combination thereof

[SOURCE: ISO 6707-2:2017, 3.5.18]

3.14

procurement document

documentation used to initiate or conclude (or both) a *contract* ([3.7](#))

[SOURCE: ISO 10845-1:2020, 3.25]

3.15

production information

information which provides the detailing, performance definition, specification, sizing and positioning of all systems and components enabling either construction or the production of further information for construction

3.16

project delivery

the combination of all planning, technical, administrative and managerial actions and activities associated with the construction, supply, refurbishment, rehabilitation, alteration, maintenance or disposal of construction works

3.17

project delivery team

individuals or entities who, through coordinated activities, are collectively responsible for producing project deliverables

3.18

project delivery management plan

a plan which, as a minimum, summarises the asset management plan, provides a credible forecast of current and net demand for construction works or requirements for functionality and prioritises projects against a forecasted budget over a number of years

3.19

project value

the outcome of client decision making to achieve an optimal balance of the project benefits, risks and costs

3.20

risk

effect of uncertainty on objectives

Note 1 to entry: An effect is a deviation from the expected. It can be positive, negative or both, and can address, create or result in opportunities and threats.

Note 2 to entry: Objectives can have different aspects and categories, and can be applied at different levels.

Note 3 to entry: Risk is usually expressed in terms of risk sources, potential events, their consequences and their likelihood.

[SOURCE: ISO 31000:2018, 3.1]

3.21

scope of work

document that specifies and describes the goods, services, or 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

Note 1 to entry: The term “scope of work” is a generic term that may be used to describe that which is commonly referred to in forms of contract and publications as

- a) supply contract: scope, goods information or specifications,
- b) service contract: scope, services information, specifications, scope of services, terms of reference or technical specification, and
- c) construction contracts: works information, production information, specifications, project specifications, specifications, performance requirements, specification of work or scope.

Note 2 to entry: The term “scope of work” is also sufficiently broad to include design and procurement requirements in design and construct, develop and construct and management contracting strategies relating to construction contracts (see ISO 10845-2 and ISO 22058).

[SOURCE: ISO 10845-1:2020, 3.29]

3.22

stakeholder

person, group or organization that has interests in, or can affect, be affected by, or perceive itself to be affected by, any aspect of the project

[SOURCE: ISO 21500:2021, 3.18, modified — “programme or portfolio” at the end of the definition has been removed.]

3.23

sustainable development

development that meets the environmental, social and economic needs of the present without compromising the ability of future generations to meet their own needs

[SOURCE: ISO Guide 82:2014, 3.2, modified – Note 1 to entry has been removed.]

3.24

value for money

optimal use of resources to achieve intended project outcomes

Note 1 to entry: Optimal use of resources results in the most desirable possible outcomes given expressed or implied restrictions or constraints.

[SOURCE: ISO 10845-1:2020, 3.40]

3.25

value proposition

the promise of measurable benefits

Note 1 to entry: The client’s business case, vision, values and project priorities collectively make up the client’s value proposition for a project

4 Delivery management concepts

4.1 Fundamentals of construction works projects

Construction works result from the management and integration of five primary resources, namely finance, people, materials, plant and equipment. Such works are delivered through a supply chain which needs to be procured, mobilized and directed to provide the necessary professional services, labour and equipment, materials, products, components, assemblies and plant required to provide the works.

Contracts bind the participants in the supply chain (professionals, general contractors, suppliers of materials or equipment, suppliers, manufacturers, fabricators, service providers, subcontractors, etc.) and defines the obligations, liabilities and risks that link the parties together. Direct contracts can be entered into with consultants, service providers, suppliers and contractors who in turn may subcontract some of their responsibilities under their contracts to subcontractors. The client's packaging strategy (a component of a procurement strategy) which focuses on the organization of work into contracts or orders issued in terms of a framework agreement determines the number of contractual relationships which the client needs to put in place, oversee and administer (see ISO 22058).

Subcontracting is a well-established national and international practice within the construction industry. It is an effective means of involving small, medium and micro enterprises in the supply chain which delivers construction works. The contractor provides the overall planning for the project, coordinates the many interfaces between the sub-contractors and, unless otherwise stated in the contract with the client, remains responsible for providing the works as if the work had not been subcontracted. Subcontractors in turn manage their own work on site and off site.

4.2 The delivery process

4.2.1 Overview

Construction works projects are necessary to support organisational strategic objectives according to an organisation's purpose and values. The client's business case, vision, values and project priorities collectively make up the client's value proposition for a project. A client needs to provide effective leadership of the project throughout the delivery cycle, commencing at a strategic level and ending at the close out of a project. A client also needs to:

- obtain the necessary resources which primarily relate to finance, people, materials, plant and equipment, to deliver the project;
- contract and mobilise a supply chain (linked set of resources and processes) to provide the necessary professional services, labour and equipment and to manufacture or supply materials, products, components, assemblies and plant; and
- make executive decisions to enable project delivery outcomes which realize benefits for not only the organisation but also for internal or external stakeholders.

[Figure 1](#) illustrates the process whereby a client's value proposition is transformed into project delivery outcomes (see ISO 20258). Project outcomes result in construction works projects with the required functionality, performance, and quality in all its forms, ready for use, with a concomitant impact on the three aspects of sustainability (economic, environmental and social). Project value, on the other hand, is the outcome of client decision making to achieve an optimal balance of the project benefits, risks and costs.

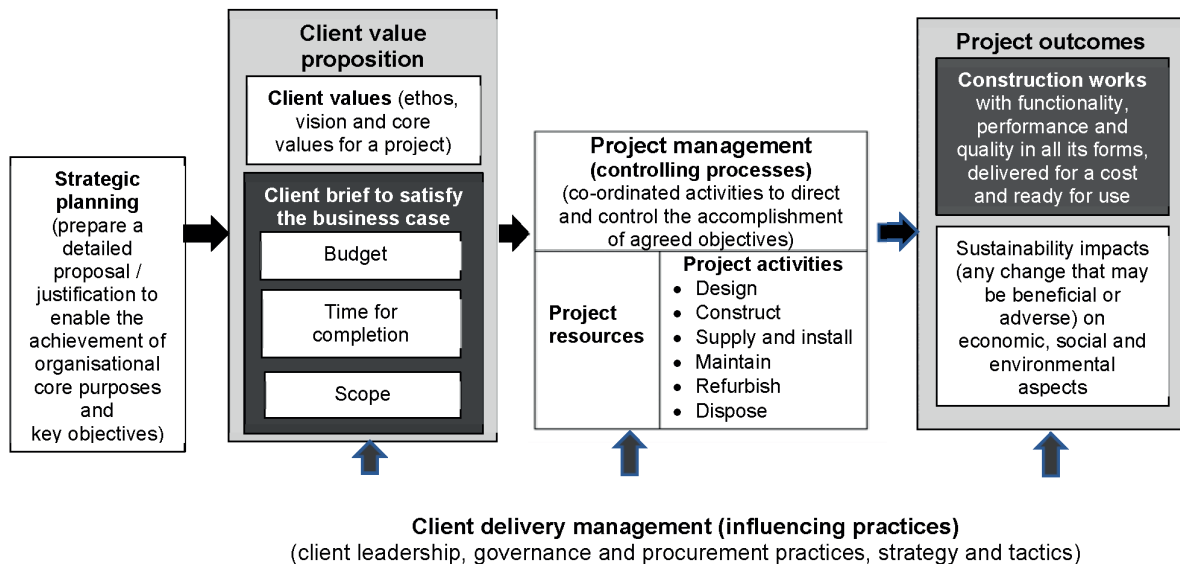


Figure 1 — Translating the client value proposition into project outcomes

4.2.2 Organisational governance practices

Each organization has its own functions with responsibilities, authorities and relationships to achieve its objectives and a governing body which has ultimate accountability for the whole organization. Organizations are guided by governance frameworks (strategies, policies, decision-making structures and accountabilities through which the organization's governance arrangements operate) and which ensure that the organization remains true to its purpose (see ISO 37000).

Project delivery is necessary to support the strategic and business objectives of client organisations according to their purpose and values and needs to be delivered within the client's organisational governance framework. Client organisational governing bodies need to hold management to account to ensure that construction works projects embrace the culture, norms and practices of the organization and align with its purpose. They need to make decisions informed by credible information and reliable data, anticipated operational costs, stakeholders, ethical and societal expectations, compliance obligations, open and honest reporting and natural environment limitations and impacts (see ISO 37000).

4.2.3 Controlling practices

The purpose of controlling a project is to monitor and measure performance against an agreed plan, including authorized changes. ISO 21502 provides guidance on practices relating to the control of any type of project located within any industry. The following adaptations should be considered to deal with the specificities of construction works projects:

- the business need is frequently satisfied through multiple contracts which need to be procured and managed in such a way that the anticipated benefits are progressively realized;
- there are several interfaces and interdependencies between contracts where delays in or failure to put in place one contract or timeously complete a contract or a part thereof has a knock-on effect which not only delays project completion but can significantly increase project costs;
- demand is most often determined and managed through service life plans which are based on an assessment of current performance against desired levels of service or functionality and asset management plans which provide a credible forecast of current demand and net demand for services or requirements for functionality over a period of time;

- demand needs to be proactively managed through the planning, evaluation and award and contract management phases to prevent scope creep i.e., changes, continuous or uncontrolled growth in a project's scope, at any point after the project commences;
- a range of different combinations of goods and services with differing characteristics such as initial cost, reliability, life-cycle costs, and operating costs can satisfy user requirements;
- risks are high due to uncertainties at the time when the contract is concluded;
- a supply chain frequently needs to be contracted, mobilized, and overseen to provide the necessary professional services, materials, products, components and assemblies, equipment and labour to fulfil the requirements of contracts; and
- the final or outturn contract price equates to the sum of the initial contract price for work, which is known, the cost of changes in scope of contract (variations) to enhance quality performance or to address shortcomings which can impair performance, the amount of contract price adjustment for inflation provided for in the contract and the cost of risk events that materialize in the execution of a contract for which the supplier / contractor is not responsible (see Annex E of ISO 10845-1:2020).

4.2.4 Influencing practices

During the process of converting a value proposition into project outcomes, the client needs to perform the following delivery management practices to realise project value:

- plan – decide on what needs to be done, how it is to be resourced and achieved and in what time frames, and set a budget;
- specify – define the organisation's functional and other requirements for the project clearly and precisely;
- procure – obtain project resources (internal and external) to perform project activities with care and effort; and
- oversee delivery – observe and define the execution of the project to realise the organisation's value proposition associated with the project justification.

Delivery management includes a “buyer function” within procurement processes. However, the buyer-supplier relationship differs from non-construction works projects in that the buying or client function requires significant built environment professional capability throughout the process of conceptualisation to implementation, operation and maintenance i.e., through the full life-cycle of the project (see Annex B of ISO 10845-1:2020).

Note Delivery management activities include planning at a programme and project level.

4.3 Procurement cycle associated with the delivery of a construction works project

A typical procurement cycle for the delivery of a construction works project is indicated in [Figure 2](#) (see Annex A of ISO 22058:2022). It comprises three phases, namely,

- a planning phase during which decisions are made as to what, where and when goods and services are required, how the market is to be approached and what is the number, type, nature and timing of the required contracts;
- an evaluation and award phase during which contracts are entered into following the development of procurement tactics enabling a procurement strategy to be effectively implemented and the application of the method by which tender offers are solicited from the market; and
- a contract administration phase during which compliance with requirements, changes in requirements and risk events which manifest during the execution of contracts are managed, the works are commission and contracts are closed out.

Construction works projects are identified during strategic planning processes or through the identification of critical needs identified within an asset management system (see [Annex A](#)). Thereafter projects need to be motivated by considering the benefit of the project and / or consequences of not undertaking the project.

Procurement strategy is required to engage with the market commencing with a make or buy decision and if the decision is to make, whether design and interface management responsibilities are to be retained or transferred (see ISO 22058). During the planning and specifying stage, a strategic brief is developed, which defines project objectives, needs, acceptance criteria and client priorities and aspirations, and which sets out the basis for the development of a concept report. A concept report is then developed which sets out a viable solution to the strategic brief (see [Annex B](#)). A decision is then made to implement the project. A gateway review or financial feasibility studies may be required to inform this decision.

During the evaluation and award phase procurement tactics are developed to effectively implement the adopted procurement strategy (see ISO 22058) and procurement documents are developed (see ISO 10845-1, ISO 10845-2, ISO 10845-3 and ISO 10845-4) prior to approaching the market for the services of a contractor. Tender offers are then solicited and evaluated, and a contract is awarded to the successful tenderer (see ISO 10845-1).

The delivery of construction works needs to be overseen during the contract administration phase where contracts are administered in accordance with the administrative procedures included in the conditions of contract and compliance with the requirements of the contract is confirmed. The commissioning of the works, the handing over of the works to the end user or operator and the close out of the contract needs to be overseen.

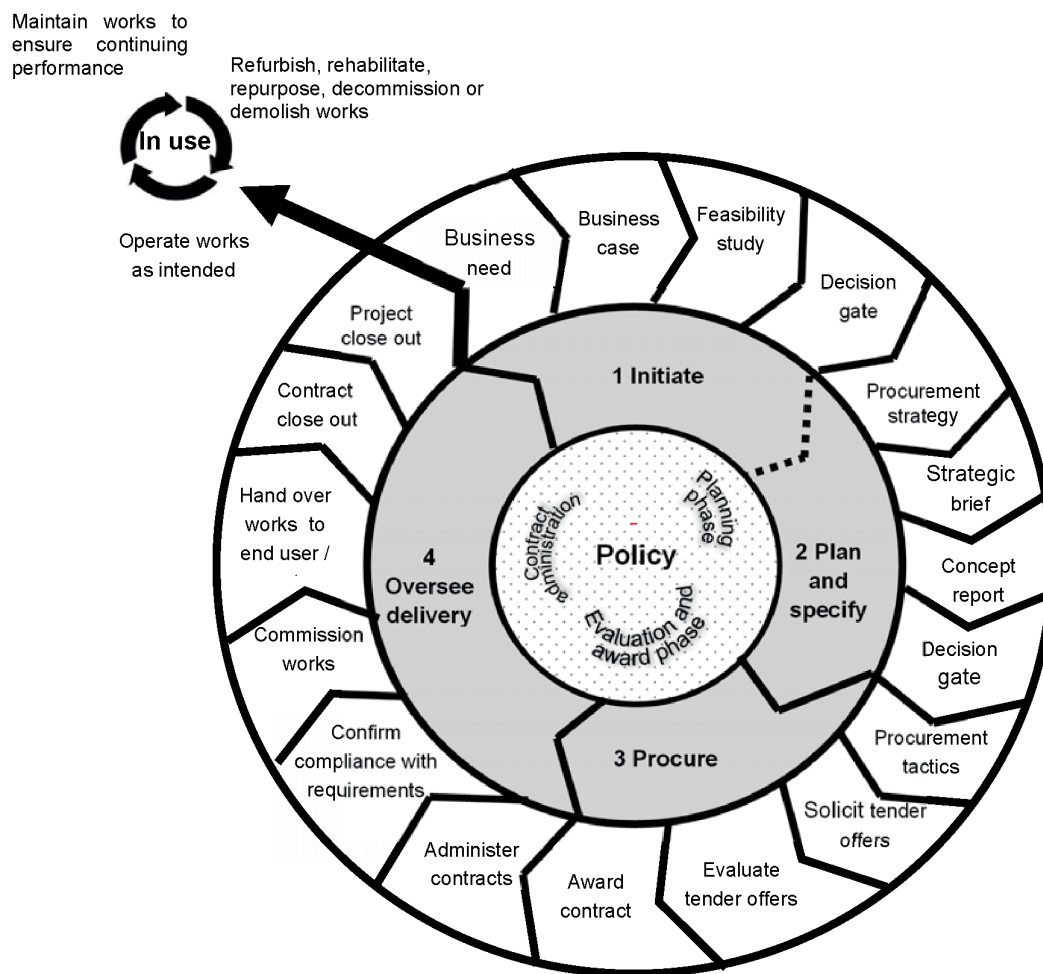


Figure 2 — The procurement cycle for construction works (ISO 22058)

Note [Figure 2](#) indicates the procurement cycle for new construction works. Although the project ends following the close out of the contract, procurement of resources can be required to operate and maintain the construction works in use. Projects to refurbish, rehabilitate, repurpose, decommission or demolish existing construction works can be required in which case new projects will be initiated using many of the subphases indicated in [Figure 2](#).

4.4 Context for project delivery

4.4.1 Regional, organisational and project context

4.4.1.1 Overview

Activities associated with construction works projects take place within a regional, organizational and project context. [Figure 3](#) depicts these project informants as a sequence of ideas each of which establishes the system boundaries for the next. Different role players in the delivery process are commonly required to manage these system boundaries. Typically, the organisational governing body manages the interface between the underlying regional content and the organisation, the client delivery management team the boundary between organisational constraints and the project controls while the project delivery team manages the boundaries between the project controls and activities.

Themes associated with the social, ethical, cultural, economic, political and physical characteristics of a region can impact adversely or beneficially on the delivery of construction works projects. The regional themes also shape and constrain an organization's governance system. Organizational constraints including law and regulation, organizational governance, values, financial, policy and technology in turn constrain aspects of construction works.

4.4.1.2 Organisational constraints

Regional themes such as those indicated in [Figure 3](#) shape and constrain the system by which an organization is directed, overseen, and held accountable for achieving its defined purpose which at its foundation includes (see ISO 37000):

- setting the purpose, mission, vision, organizational ethos, organizational values, and culture to give the organization direction;
- steering the strategy and balancing resources appropriately to achieve that purpose;
- exercising oversight of the organization's performance, ensuring compliance and viability; and
- engaging with and accounting to stakeholders.

Organisations have executive managers who have authority delegated from the governing body for the implementation of policies and strategies to fulfil the purpose of the organisation. Governance involves setting and being accountable for the purpose and parameters for the organisation, whereas management is about fulfilling the associated objectives within those parameters. Accordingly, governance authorises, directs, empowers, provides oversight and limits the actions of management while management works within the constraints set by the organisation's governance to achieve the organisation's objectives. Management is about getting the work done whereas governance is about ensuring that the right purpose is pursued in the right way.

Organisations may put in place a number of systems to effectively implement aspects of governance frameworks across all units within the organisation. These systems can include quality management systems (see ISO 9001, ISO 9004 and ISO 10006), environmental management systems (see ISO 14001), business management continuity systems (see ISO 22301), security management system, including those aspects critical to security assurance of the supply chain (see ISO 28000), anti-bribery management systems (see ISO 37001), risk management system (see ISO 31000), auditing management system (see ISO 19011), occupational health and safety management systems (see ISO 45001) and compliance management systems (see ISO 37301).

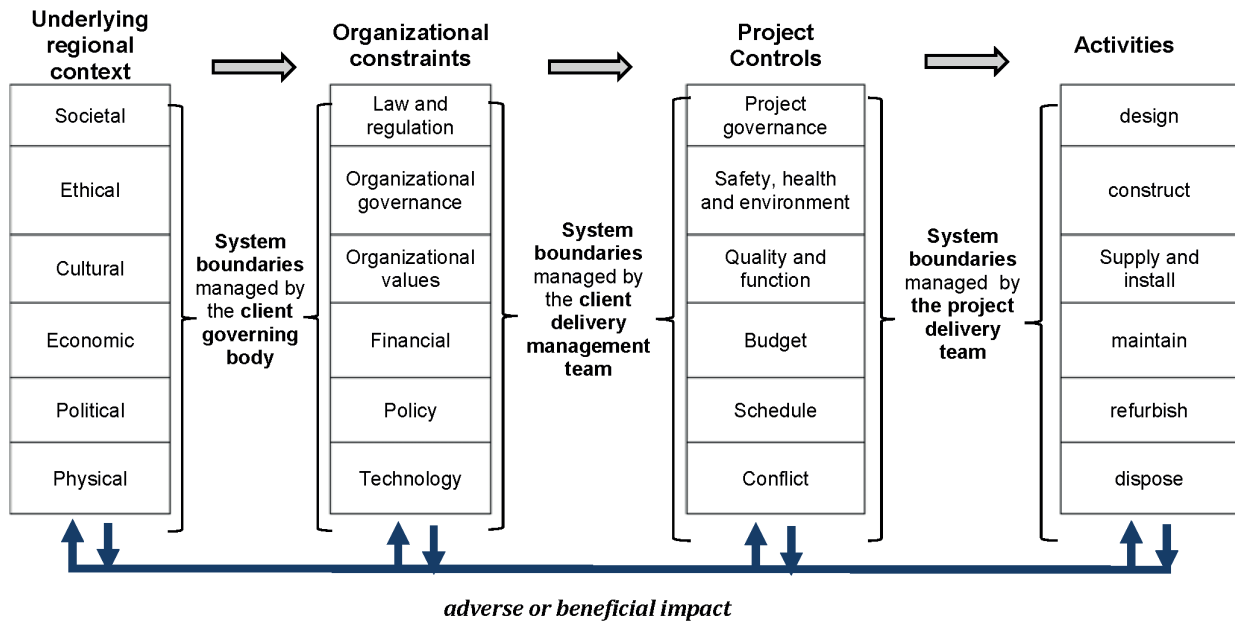


Figure 3 — The context within which project delivery takes place

Governing bodies may also put in place specific policies to:

- integrate project, programme and portfolio management with the organization's overall governance (see ISO 21505);
- integrate sustainability within procurement (see Annex C of ISO 10845-1:2020 and ISO 20400);
- address impacts of organizational decisions and activities on society and the environment (social responsibility) (see ISO 26000), resilience in the supply chain (see ISO 28002), governance in information technology for the organization (see ISO/IEC 38500), and the management of collaborative business relationships (see ISO 44001); and
- ensure interoperability in information management systems during the various stages of a project (see ISO 19650-1 and ISO 19650-2).

4.4.1.3 Project governance

Projects are delivered against a client's brief which is informed by:

- the client's business case for a project; and
- the client's value proposition for a project which can be realised in the delivery of the project).

The activities directly related to the provision of construction works take place within project management controls which seek to accomplish agreed project objectives. Such objectives are fulfilled by a combination of (see ISO 21502):

- deliverables - unique and verifiable elements that are required to be produced by a project;
- outputs - aggregated tangible or intangible deliverables that form the project result;
- outcomes - change resulting from the use of the output from a project; and
- benefits - created advantage, value or other positive effect.

The focus of project management controls is primarily on budget, schedule, function, quality, conflict, health and safety and the environment. Project management controls are informed by delivery constraints which

in turn are shaped within regional characteristics and the organization's governance system as indicated in [Figure 3](#).

Controls can also be included to address:

- compliance with organisational policies; and
- additional client goals in the form of key performance indicators (KPIs) which can be measured, quantified, verified and audited for compliance and can be reported on during the execution of a project (see Annex G of ISO 10845-1:2020 and ISO 22058).

4.4.2 Risk

4.4.2.1 Causes and sources of risk

Although many construction works projects are similar in nature, each project is unique and presents its own set of risks. This is due to several important project variables employed in delivering the required construction works including:

- what is delivered, differences between locations where the construction works projects are delivered, the client's value proposition for projects, stakeholder influences, resources employed, constraints, and processes and procurement practices; and
- different combinations of funders, clients and built environment professionals, site conditions, materials and technologies and general contractors, specialist contractors, skills and workforces.

Construction works projects need to be planned, specified, procured and delivered. Once decisions are made on what the project needs to deliver, who will deliver it and how it will be funded and governed, the remaining decisions centre on how it will be managed through to completion. Such management takes place within a project-specific environment which continuously involves the management of risk events, which may be foreseen or unforeseen, and which have the potential to negatively impact on project outcomes during the protracted delivery process.

Sources of risk in construction works projects include those relating to client / owner behaviour, human behaviour, community opposition / unrest, design (omissions/ interfaces / changes), economic circumstances, finances, force majeure, political and regulatory frameworks, project governance, technical aspects, technology, third parties (subcontractors / suppliers), environmental safeguards, natural events, weather and inherent site conditions. Risks can also manifest in weak clients who are not capable of making timeous decisions or have difficulty in providing information timeously or in paying promptly for work done.

4.4.2.2 Allocating risk between the client and the contractor

Risks that are known with total or specific certainty can generally be identified by the parties in the analysis of risks. Unknown risks with general and total uncertainty are generally new and emerging risks, which in all probability are not predicted or included in the risk analysis.

A central issue that needs to be dealt with in construction works projects is the financial liability related to the risks which can manifest during the performance of the contract. The parties (client and contractor) to a contract can exercise choices on how to deal with inherent project risks, the focus of which is on the payment and responsibility for the cost of the event should it materialize. Risk can be contractually retained or transferred. In some instances, insurances can be taken out to cover risks e.g., as a hedge against adverse currency exchange rate fluctuations or to cover storm damage to the works. The contractor tries to limit liability in contracts to a foreseeable figure, includes an allowance for risks in his tendered prices and spreads the risk across his projects. The contractor is paid his risk allowance included in the prices irrespective of whether a risk event occurs. The client may share risks with the contractor to reduce risk pricing but needs to make provision in the budget to fund through contingencies the risk events for which the contractor is not at risk that may materialize during the performance of the contract. Increasing the risk borne by the contractor inevitably increases the price of the contract. Conversely, if the client retains certain risks, it only pays for risks that materialize. Value for money is achieved when the efficiency gains by transferring risk

are higher than the losses from inefficient risk pricing, particularly where tenders are awarded on the basis of least cost.

4.4.2.3 Implications of excessive risk transfer

The more risk that is transferred through contracts the fewer the firms that are willing to submit tenders. Not all firms have sufficiently large balance sheets to accept the full construction risk. Incumbents in local markets may have an information and experience advantage over new entrants. Less competition in turn can have a knock-on effect on risk pricing. Reducing uncertainty for new entrants increases the competition in the local market. The higher the uncertainty, the higher the risk pricing. An underestimate of risk results in the “winner’s curse” which can lead to a failure to deliver on contractual obligations. The winner is often the tenderer who least overestimates the risk.

Drivers of inefficient risk pricing include excessive transfer of risk, lender requirements which require a high degree of certainty, availability of sufficient and reliable information and sufficient time for preparation of tenders. Risk pricing inefficiency can be reduced through design clarity and flexibility, following established risk allocation principles where the key objective is to contain the cost of the risk, and considering the benefits of joint risk management. Relational contracting based on collaborative procurement strategies to manage unforeseen events in complex projects, early contractor involvement and alliancing can also lead to a reduction in risk pricing.

4.4.2.4 Framing of delivery models

Delivery models are framed around the retention of risk by the client and the transfer of risk to the contractor. Procurement strategies and tactics influence project outcomes. Differentiators between delivery models include:

- the treatment of risk (risk allocation and / or risk sharing);
- the mitigation of risk through collaborative approaches and making use of competitive dialogue / negotiations to address uncertainties in tender processes;
- the extent to which activities external to the project are bundled;
- the associated scope of the project contracts;
- the approach to remuneration (fixed price, reimbursement or target price) within these contracts;
- positive / negative incentives such as pain/ gain share regimes and performance bonds; and
- how contractors get involved in the design process (early contractor involvement).

4.4.2.5 Impact of change

Change is any variation from the way work is planned, designed, budgeted or scheduled. It can arise from design changes, scope of work changes, delays in finalising / issuing of production information, unforeseen site conditions, regulatory changes, inadequate specifications / production information, schedule changes and subcontractor performance. Change is expected on any construction works project due to evolving circumstances and requirements which can impact upon project outcomes. Change can be either positive or negative. Positive change comes about when it enhances the project outcomes or when it rectifies circumstances that would otherwise harm a project. Negative change in the absence of diligent implementation can have dire consequences resulting in cost and schedule overruns, sub-standard project outcomes, lost profits and ruined relationships.

The direct impact of any change includes for the impact of added scope, and delays, and is likely to have multiple dimensions, but needs ultimately to be transformed into impacts of cost and time. Secondary impacts (disruption, cumulative impact, ripple effects, etc.) are the additional, or effect on the cost of performing work which is not directly changed, i.e., the unchanged work. This is the added cost due to lowered productivity or increased rework on the unchanged work. These impacts result from out of sequence working, engineering rework, reduced productivity, hiring new staff with the requisite qualifications / experience to recover the

programme time lost, increased overtime, night shifts, management / oversight stretch and attention span, workforce morale, out of sequence flow of information to vendors, partners, etc.

The secondary impacts of change on a project are difficult to address and define as they:

- can be widely separated in space and time from the cause, but need to be tied to their source,
- can be cumulative across large numbers of individual impacts,
- are fundamentally about productivity and rework, which are hard to measure; and
- present a challenging analytical task to quantify.

NOTE The secondary impacts of change can have a far greater impact on the project than the direct impacts of change as they grow disproportionately over more and more changes and appear sometime after the initial change event has occurred and variations in project conditions drive different secondary impacts. Early resolution can cut their impact significantly. Secondary impacts can be significantly reduced by less tight project schedules.

4.5 Client organisation inputs into projects

4.5.1 Overview

An organization functioning as a client, initiates and finances a project and approves the requirements for the project as captured in a brief and any changes thereto. The principal function of the client organization is to ensure that a solution to the business case for a project is achieved. The client, as such owns the business case of the project and is accountable for project outcomes. The client needs to provide effective leadership of the project throughout the project delivery cycle, commencing at a strategic level and ending at the close out of a project. The client also needs to obtain the necessary resources to deliver the project and make executive decisions to enable project delivery outcomes which realize benefits for not only the organization but also for internal or external stakeholders.

A client should:

- establish a clear business case, which captures intent, at the inception of a project, constantly revisit the business case to verify its assumptions, objectives and ongoing validity,
- carefully monitor objectives and remain vigilant for changes throughout the project delivery cycle that can impact on a project and its business case;
- ensure that adequate maintenance regimes and protocols are put in place to ensure long term sustainability of the construction works that is delivered;
- ensure compliance with legislative provisions including those relating to health, safety and the environment and the obtaining of the necessary statutory permissions;
- be bold enough to make timely decisions such as to initiate corrective action if necessary and to halt, terminate or curtail the project if it becomes unviable or there is insufficient budget to complete the project or related projects; and
- pay contracted resources on time.

4.5.2 Values and vision

Values determine the ethos, vision and core principles of a project. They shape not only the culture for the project but also the “delivery intent” of a project. They typically comprise several competing aims relating to the delivery process and delivery outcomes. Values also establish the client’s aspirations for a project which needs to be reflected in not only the delivery processes but also in the construction works. Legislation can establish minimum requirements relating to issues such as equity, health and safety and protection of the environment. Values establish aspirations or desirable outcomes which are beyond minimum requirements embedded in legislation and policy. Values serve as broad guidelines in all situations where choices need to be made regarding which path to follow. They enable those responsible for delivering projects to understand