

# INTERNATIONAL STANDARD

# ISO 21500

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## Guidance on project management

*Lignes directrices sur le management de projet*



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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.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 21500 was prepared by Project Committee ISO/PC 236, *Project management*.

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**<http://www.surveymonkey.com/s/21500>**

## Introduction

This International Standard provides guidance on concepts and processes of project management that are important for, and have impact on, the performance of projects.

The target readership for this International Standard is the following:

- senior managers and project sponsors, in order to provide them with a better understanding of the principles and practice of project management and to help them give appropriate support and guidance to their project managers, project management teams and project teams;
- project managers, project management teams and project team members, so that they have a common basis upon which to compare their project standards and practices with those of others;
- developers of national or organizational standards, for use in developing project management standards, which are consistent at a core level with those of others.



# Guidance on project management

## 1 Scope

This International Standard provides guidance for project management and can be used by any type of organization, including public, private or community organizations, and for any type of project, irrespective of complexity, size or duration.

This International Standard provides high-level description of concepts and processes that are considered to form good practice in project management. Projects are placed in the context of programmes and project portfolios, however, this International Standard does not provide detailed guidance on the management of programmes and project portfolios. Topics pertaining to general management are addressed only within the context of project management.

## 2 Terms and definitions

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

### 2.1

#### **activity**

identified component of work within a schedule that is required to be undertaken to complete a project

### 2.2

#### **application area**

category of projects that generally have a common focus related to a product, customer or sector

### 2.3

#### **baseline**

reference basis for comparison against which project performance is monitored and controlled

### 2.4

#### **change request**

documentation that defines a proposed alteration to the project

### 2.5

#### **configuration management**

application of procedures to control, correlate and maintain documentation, specifications and physical attributes

### 2.6

#### **control**

comparison of actual performance with planned performance, analysing variances and taking appropriate corrective and preventive action as needed

### 2.7

#### **corrective action**

direction and activity for modifying the performance of work to bring performance in line with the plan

### 2.8

#### **critical path**

sequence of activities that determine the earliest possible completion date for the project or phase

### 2.9

#### **lag**

attribute applied to a logical relationship to delay the start or end of an activity

**2.10**

**lead**

attribute applied to a logical relationship to advance the start or end of an activity

**2.11**

**preventive action**

direction and activity for modifying the work, in order to avoid or reduce potential deviations in performance from the plan

**2.12**

**project life cycle**

defined set of phases from the start to the end of the project

**2.13**

**risk register**

record of identified risks, including results of analysis and planned responses

**2.14**

**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

**2.15**

**tender**

document in the form of an offer or statement of bid to supply a product, service or result, usually in response to an invitation or request

**2.16**

**work breakdown structure dictionary**

document that describes each component in the work breakdown structure

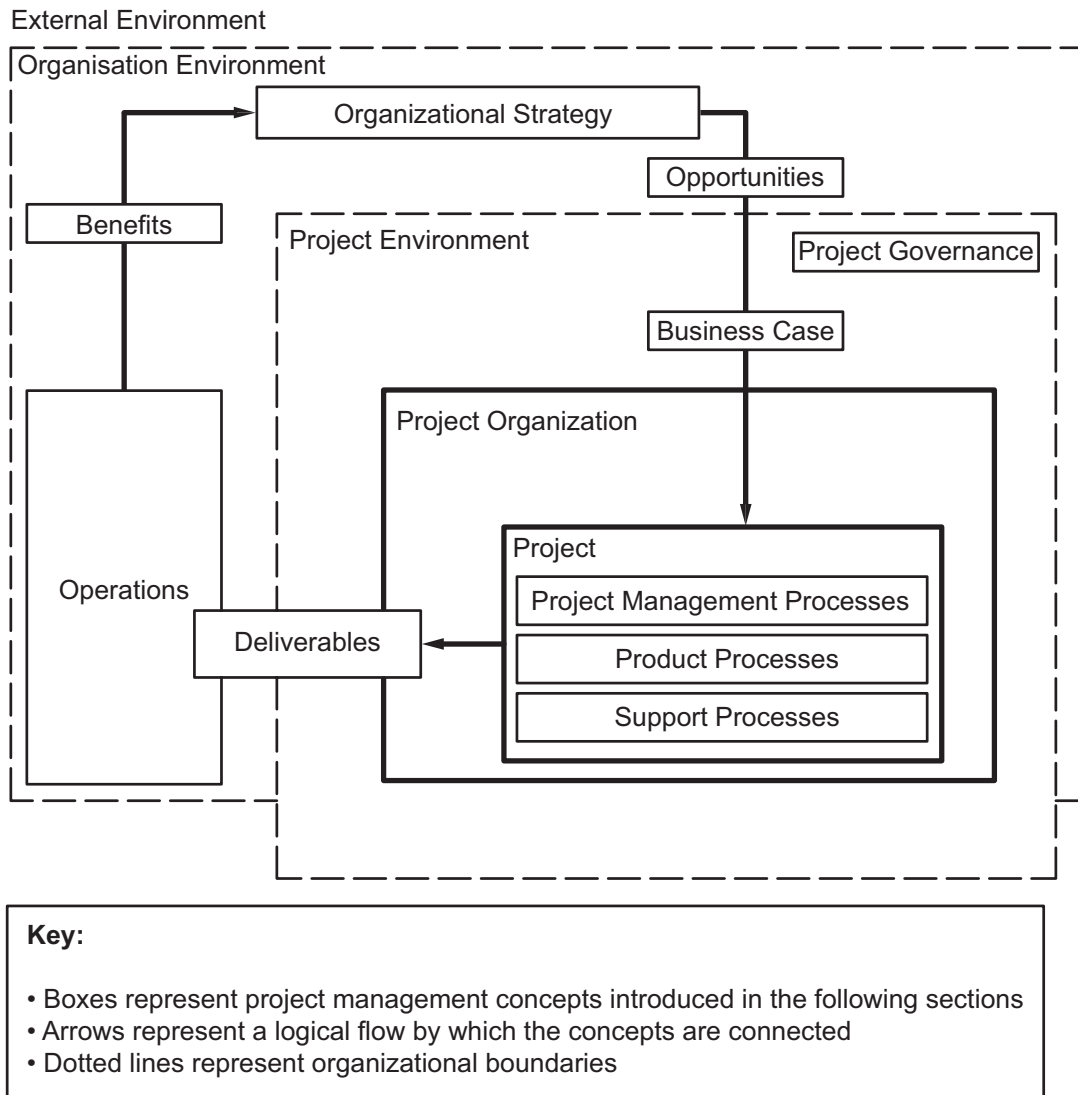
### **3 Project management concepts**

#### **3.1 General**

This clause describes key concepts applicable to most projects. It also describes environments in which projects are performed.

Figure 1 shows how project management concepts relate to each other. The organizational strategy identifies opportunities. The opportunities are evaluated and should be documented. Selected opportunities are further developed in a business case or other similar document, and can result in one or more projects that provide deliverables. Those deliverables can be used to realize benefits. The benefits can be an input to realizing and further developing the organizational strategy.





**Figure 1 — Overview of project management concepts and their relationships**

### 3.2 Project

A project consists of a unique set of processes consisting of coordinated and controlled activities with start and end dates, performed to achieve project objectives. Achievement of the project objectives requires the provision of deliverables conforming to specific requirements. A project may be subject to multiple constraints, as described in 3.11.

Although many projects may be similar, each project is unique. Project differences may occur in the following:

- deliverables provided;
- stakeholders influencing;
- resources used;
- constraints;
- the way processes are tailored to provide the deliverables.

Every project has a definite start and end, and is usually divided into phases, as described in 3.10. The project starts and ends as described in 4.3.1.

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### 3.3 Project management

Project management is the application of methods, tools, techniques and competencies to a project. Project management includes the integration of the various phases of the project life cycle, as described in 3.10.

Project management is performed through processes. The processes selected for performing a project should be aligned in a systemic view. Each phase of the project life cycle should have specific deliverables. These deliverables should be regularly reviewed during the project to meet the requirements of the sponsor, customers and other stakeholders.

### 3.4 Organizational strategy and projects

#### 3.4.1 Organizational strategy

Organizations generally establish strategy based on their mission, vision, policies and factors outside the organizational boundary. Projects are often the means to accomplish strategic goals. An example of a value creation framework is shown in Figure 2.

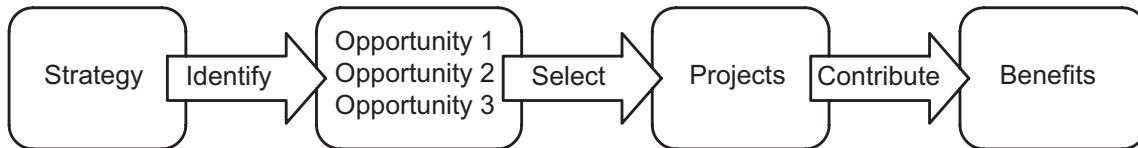


Figure 2 — Example of a value creation framework

Strategic goals may guide the identification and development of opportunities. Opportunities selection includes consideration of various factors, such as how benefits can be realized and risks can be managed.

The project goal is to provide measurable benefits that contribute to realizing the selected opportunities. The project objective contributes to the project goal by creating the required deliverables. Project goals are achieved when the benefits are realized. Goals might not be achieved until a period of time after the objectives are achieved.

#### 3.4.2 Opportunity evaluation and project initiation

Opportunities may be evaluated to support informed decision-making by responsible management, in order to identify feasible projects that could transform some or all of these opportunities into realized benefits.

These opportunities may address, for example, a new market demand, a current organizational need or a new legal requirement. The opportunities are often evaluated through a set of activities that provide formal authorization to start a new project. The organization should identify a project sponsor to be responsible for project goals and benefits.

The goals and benefits may result in a justification for the investment in the project, e.g. in the form of a business case, and that may contribute to a prioritization of all opportunities. The purpose of the justification is usually to obtain organizational commitment and approval for investment in the selected projects.

The evaluation process may include multiple criteria, including financial investment appraisal techniques and qualitative criteria, such as strategic alignment, social impact and environmental impact. Criteria may differ from one project to another.

#### 3.4.3 Benefits realization

Benefits realization is generally the responsibility of organizational management, which may use the deliverables of the project to realize benefits in alignment with the organizational strategy. The project manager should consider the benefits and their realization as they influence decision-making throughout the project life cycle.

### 3.5 Project environment

#### 3.5.1 General

The project environment may impact project performance and success. The project team should consider the following:

- factors outside the organizational boundary, such as socio-economic, geographical, political, regulatory, technological and ecological;
- factors inside the organizational boundary, such as strategy, technology, project management maturity, resource availability, organizational culture and structure.

#### 3.5.2 Factors outside the organizational boundary

Factors outside the organizational boundary may have an impact on the project by imposing constraints or introducing risks affecting the project. Although these factors are often beyond the control of the project manager, they should still be considered.

#### 3.5.3 Factors inside the organizational boundary

##### 3.5.3.1 General

A project usually exists inside a larger organization encompassing other activities. In such cases, there are relationships between the project and its environment, business planning and operations. Pre-project and post-project activities may include activities such as business case development, conducting feasibility studies and transition to operations. Projects may be organized within programmes and project portfolios. Figure 3 illustrates these relationships.

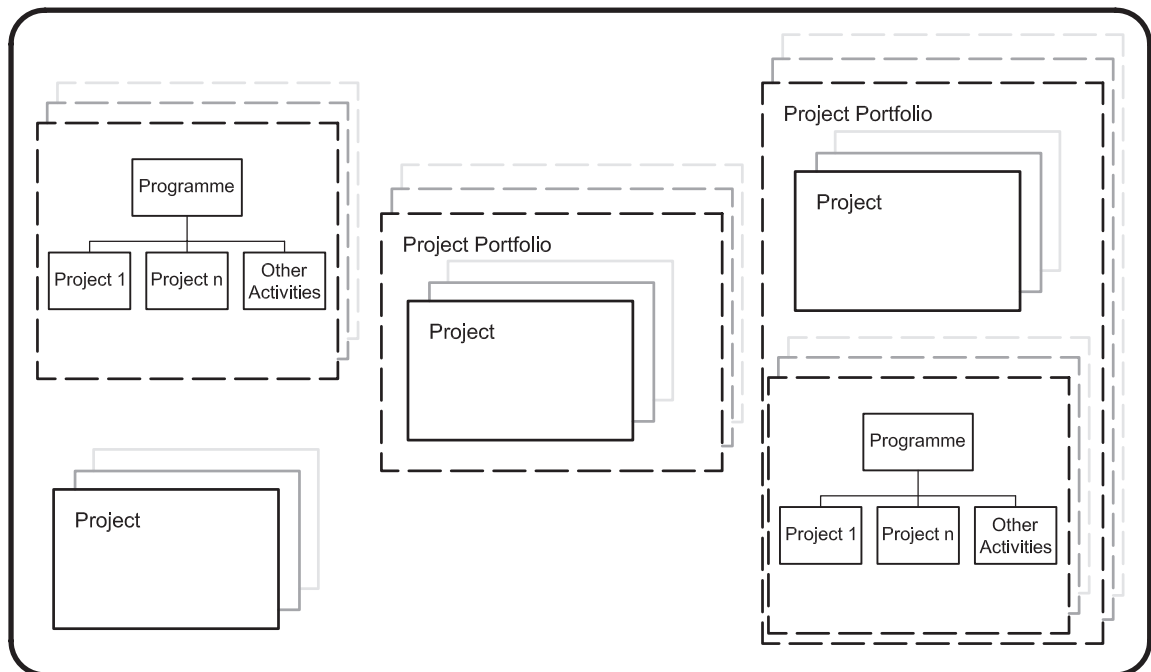


Figure 3 — Projects, programmes and project portfolios

##### 3.5.3.2 Project portfolio management

A project portfolio is generally a collection of projects and programmes and other work that are grouped together to facilitate the effective management of that work to meet strategic goals. Project portfolio management is

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generally the centralized management of one or more project portfolios, which includes identifying, prioritizing, authorizing, directing and controlling projects, programmes and other work to achieve specific strategic goals.

It may be appropriate to conduct the opportunity identification and selection, as well as the approval and management of projects, through a project portfolio management system.

**3.5.3.3 Programme management**

A programme is generally a group of related projects and other activities aligned with strategic goals. Programme management consists of centralized and coordinated activities to achieve the goals.

**3.6 Project governance**

Governance is the framework by which an organization is directed and controlled. Project governance includes, but is not limited to, those areas of organizational governance that are specifically related to project activities.

Project governance may include subjects such as the following:

- defining the management structure;
- the policies, processes and methodologies to be used;
- limits of authority for decision-making;
- stakeholder responsibilities and accountabilities;
- interactions such as reporting and the escalation of issues or risks.

The responsibility for maintaining the appropriate governance of a project is usually assigned either to the project sponsor or to a project steering committee.

**3.7 Projects and operations**

Project management fits within the general framework of management. Project management differs from other management disciplines by the temporary and unique nature of projects.

Organizations perform work to achieve specific goals. Generally, this work may be categorized as either operations or projects. Operations and projects differ primarily as follows:

- operations are performed by relatively stable teams through ongoing and repetitive processes and are focused on sustaining the organization;
- projects are performed by temporary teams, are non-repetitive and provide unique deliverables.

**3.8 Stakeholders and project organization**

The project stakeholders, including the project organization, should be described in sufficient detail for the project to be successful. The roles and responsibilities of stakeholders should be defined and communicated based on the organization and project goals. Typical project stakeholders are shown in Figure 4.

Stakeholder interfaces should be managed within the project through the project management processes described in Clause 4.

The project organization is the temporary structure that includes project roles, responsibilities and levels of authority and boundaries that need to be defined and communicated to all stakeholders of the project. The project organization may be dependent on legal, commercial, interdepartmental or other arrangements that exist among project stakeholders.

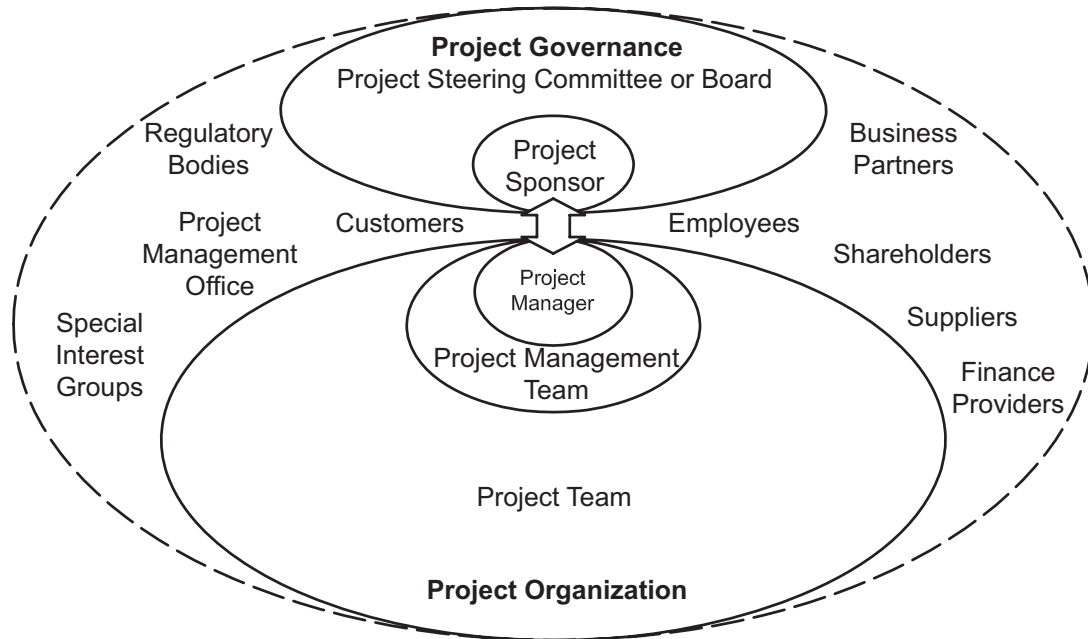
The project organization may include the following roles and responsibilities:

- a) the project manager, who leads and manages project activities and is accountable for project completion;

- b) the project management team, which supports the project manager in leading and managing the project activities;
- c) the project team, which performs project activities.

Project governance may involve the following:

- the project sponsor, who authorizes the project, makes executive decisions and solves problems and conflicts beyond the project manager's authority;
- the project steering committee or board, which contributes to the project by providing senior level guidance to the project.



**Figure 4 — Project stakeholders**

Figure 4 includes the following additional stakeholders:

- customers or customer representatives, who contribute to the project by specifying project requirements and accepting the project deliverables;
- suppliers, who contribute to the project by supplying resources to the project;
- the project management office, which may perform a wide variety of activities including governance, standardization, project management training, project planning and project monitoring.

### 3.9 Competencies of project personnel

Project personnel should develop competencies in project management principles and processes in order to achieve project objectives and goals.

Each project team requires competent individuals who are capable of applying their knowledge and experience to provide the project deliverables. Any identified gap between the available and required competence levels represented on the project team could introduce risk and should be addressed.

Project management competencies can be categorized into, but are not limited to, the following:

- technical competencies, for delivering projects in a structured way, including the project management terminology, concepts and processes defined in this International Standard;

- behavioural competencies, associated with personal relationships inside the defined boundaries of the project;
- contextual competencies, related to the management of the project inside the organizational and external environment.

Competency levels may be raised through professional development processes such as training, coaching and mentoring inside or outside an organization.

### **3.10 Project life cycle**

Projects are usually organized into phases that are determined by governance and control needs. These phases should follow a logical sequence, with a start and an end, and should use resources to provide deliverables. In order to manage the project efficiently during the entire project life cycle, a set of activities should be performed in each phase. Project phases are collectively known as the project life cycle.

The project life cycle spans the period from the start of the project to its end. The phases are divided by decision points, which can vary depending on the organizational environment. The decision points facilitate project governance. By the end of the last phase, the project should have provided all deliverables.

To manage a project throughout its life cycle, project management processes should be used for the project as a whole or for individual phases for each team or sub-project.

### **3.11 Project constraints**

There are several types of constraints and, as constraints are often interdependent, it is important for a project manager to balance a particular constraint against the others. The project deliverables should fulfil the requirements for the project and relate to any given constraints such as scope, quality, schedule, resources and cost. Constraints are generally interrelated such that a change in one may affect one or more of the other constraints. Hence, the constraints may have an impact on the decisions made within the project management processes.

Achievement of consensus among key project stakeholders on the constraints may form a strong foundation for project success.

Some constraints could be the following:

- the duration or target date for the project;
- the availability of the project budget;
- the availability of project resources, such as people, facilities, equipment, materials, infrastructure, tools and other resources required to carry out the project activities relating to the requirements of the project;
- factors related to health and safety of personnel;
- the level of acceptable risk exposure;
- the potential social or ecological impact of the project;
- laws, rules and other legislative requirements.

### **3.12 Relationship between project management concepts and processes**

Project management is accomplished through processes utilizing the concepts and competencies described in 3.1 to 3.11. A process is a set of interrelated activities. Processes used in projects are generally categorized into three major types:

- project management processes, which are specific to project management and determine how the activities selected for the project are managed;
- delivery processes, which are not unique to project management, which result in the specification and provision of a particular product, service or result, and which vary depending on the particular project deliverable;

- support processes, which are not unique to project management and which provide relevant and valuable support to product and project management processes in such disciplines as logistics, finance, accounting and safety.

This International Standard addresses only project management processes. However, it should be noted that product, support and project management processes might overlap and interact throughout a project.

## 4 Project management processes

### 4.1 Project management process application

This International Standard identifies the recommended project management processes to be used during a project as a whole, for individual phases or both. These project management processes are appropriate to projects in all organizations. Project management requires significant coordination and, as such, requires each process used to be appropriately aligned and connected with other processes. Some processes may be repeated to fully define and meet stakeholder requirements and reach agreement on the project objectives.

Project managers, in conjunction with other project stakeholders, are advised to carefully consider the processes identified in 4.3 and apply them as appropriate to the project and organizational needs.

The processes described in 4.3 need not be applied uniformly on all projects or all project phases. Therefore, the project manager should tailor the management processes for each project or project phase by determining what processes are appropriate and the degree of rigor to be applied for each process. This tailoring should be accomplished in accordance with the relevant organizational policies.

In order for a project to be successful, the following actions should be accomplished:

- select appropriate processes described in 4.3 that are required to meet the project objectives;
- use a defined approach to develop or adapt the product specifications and plans to meet the project objectives and requirements;
- comply with requirements to satisfy the project sponsor, customers and other stakeholders;
- define and manage the project scope within the constraints, while considering the project risks and resource needs to provide the project deliverables;
- obtain proper support from each performing organization, including commitment from the customers and project sponsor.

The project management processes in this International Standard are defined and described in terms of the purposes they serve, the relationships among the processes, the interactions within the processes and the primary inputs and outputs associated with each process. In the interest of brevity, this International Standard does not indicate the source of all primary inputs or where primary outputs go.

### 4.2 Process groups and subject groups

#### 4.2.1 General

The project management processes may be viewed from two different perspectives:

- as process groups (see 4.2.2) for the management of the project;
- as subject groups (see 4.2.3) for collecting the processes by subject.

These two different groupings are shown in Table 1. The individual processes are described in detail in 4.3.

**Table 1 — Project management processes cross-referenced to process and subject groups**

Subject groups	Process groups				
	Initiating	Planning	Implementing	Controlling	Closing
Integration	4.3.2 Develop project charter	4.3.3 Develop project plans	4.3.4 Direct project work	4.3.5 Control project work 4.3.6 Control changes	4.3.7 Close project phase or project 4.3.8 Collect lessons learned
Stakeholder	4.3.9 Identify stakeholders		4.3.10 Manage stakeholders		
Scope		4.3.11 Define scope 4.3.12 Create work breakdown structure 4.3.13 Define activities		4.3.14 Control scope	
Resource	4.3.15 Establish project team	4.3.16 Estimate resources 4.3.17 Define project organization	4.3.18 Develop project team	4.3.19 Control resources 4.3.20 Manage project team	
Time		4.3.21 Sequence activities 4.3.22 Estimate activity durations 4.3.23 Develop schedule		4.3.24 Control schedule	
Cost		4.3.25 Estimate costs 4.3.26 Develop budget		4.3.27 Control costs	
Risk		4.3.28 Identify risks 4.3.29 Assess risks	4.3.30 Treat risks	4.3.31 Control risks	
Quality		4.3.32 Plan quality	4.3.33 Perform quality assurance	4.3.34 Perform quality control	
Procurement		4.3.35 Plan procurements	4.3.36 Select suppliers	4.3.37 Administer procurements	
Communication		4.3.38 Plan communications	4.3.39 Distribute information	4.3.40 Manage communications	

NOTE The purpose of this table is not to specify a chronological order for carrying out the activities. Its purpose is to map subject groups and process groups.

**4.2.2 Process groups**

**4.2.2.1 General**

Each process group consists of processes that are applicable to any project phase or project. These processes, further defined in terms of purpose, description and primary inputs and outputs in 4.3, are interdependent. The process groups are independent of application area or industry focus.

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The figures in Annex A illustrate the interactions of the individual processes in each process group mapped to the subject groups identified in 4.2.3. Not all process interactions are illustrated in Annex A. The interactions illustrated represent one possible logical view of the processes. Any process may be repeated.

#### 4.2.2.2 Initiating process group

The initiating processes are used to start a project phase or project, to define the project phase or project objectives and to authorize the project manager to proceed with the project work.

#### 4.2.2.3 Planning process group

The planning processes are used to develop planning detail. This detail should be sufficient to establish baselines against which project implementation can be managed and project performance can be measured and controlled.

#### 4.2.2.4 Implementing process group

The implementing processes are used to perform the project management activities and to support the provision of the project's deliverables in accordance with the project plans.

#### 4.2.2.5 Controlling process group

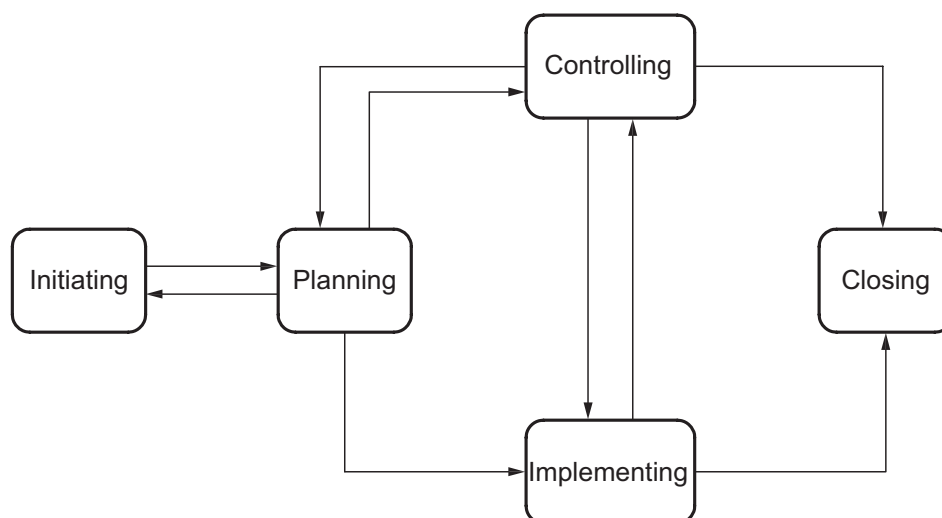
The controlling processes are used to monitor, measure and control project performance against the project plan. Consequently, preventive and corrective actions may be taken and change requests made, when necessary, in order to achieve project objectives.

#### 4.2.2.6 Closing process group

The closing processes are used to formally establish that the project phase or project is finished, and to provide lessons learned to be considered and implemented as necessary.

#### 4.2.2.7 Project management process group interrelationships and interactions

The management of a project starts with the initiating process group and finishes with the closing process group. The interdependency between process groups requires the controlling process group to interact with every other process group as shown in Figure 5. Process groups are seldom discrete or one-time in their application.



**Figure 5 — Process groups interactions**

The process groups are normally repeated within each project phase to drive the project to completion. All or some of the processes within the process groups may be required for a project phase. Not all interactions

shown in Figure 5 will apply to all project phases or projects. In practice, the processes within the process groups are often concurrent, overlapping and interacting in ways that are not shown in Figure 5.

Figure 6 elaborates on Figure 5 to show the interactions among the process groups inside the boundaries of the project, including the representative inputs and outputs of processes within the process groups. With the exception of the controlling process group, linkages between the various process groups are through individual processes within each process group. While linkage is shown in Figure 6 between the controlling process group and other process groups, the controlling process group may be considered self-standing because its processes are used to control not only the overall project, but also the individual process groups.

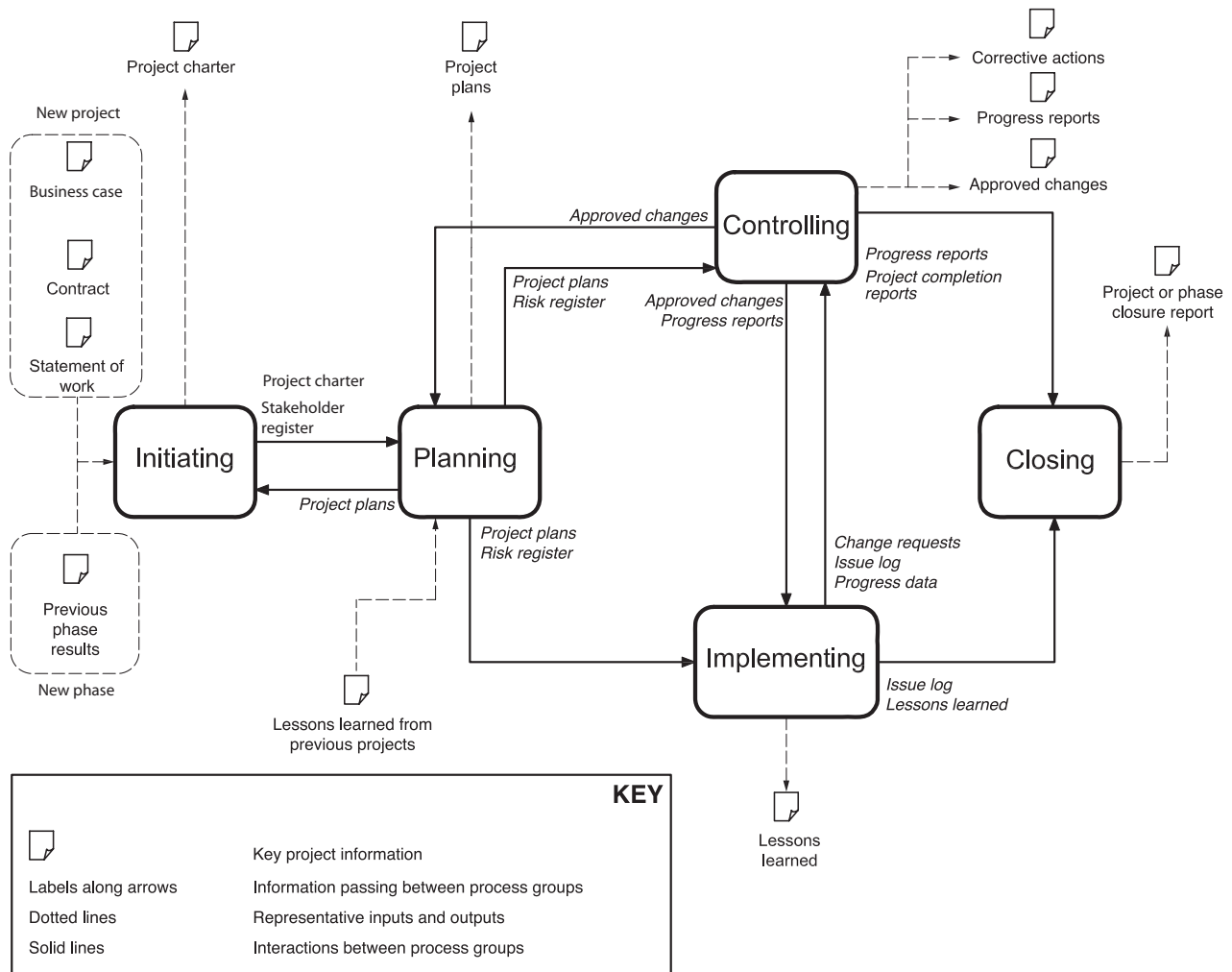


Figure 6 — Process group interactions showing representative inputs and outputs

### 4.2.3 Subject groups

#### 4.2.3.1 General

Each subject group consists of processes applicable to any project phase or project. These processes are defined in terms of purpose, description and primary inputs and outputs in 4.3, and are interdependent. Subject groups are independent of application area or industry focus.

The figures in Annex A illustrate the interactions of the individual processes in each process group identified in 4.2.2 mapped against the subject groups. Not all process interactions are illustrated in Annex A. Any process may be repeated.

**4.2.3.2 Integration**

The integration subject group includes the processes required to identify, define, combine, unify, coordinate, control and close the various activities and processes related to the project.

**4.2.3.3 Stakeholder**

The stakeholder subject group includes the processes required to identify and manage the project sponsor, customers and other stakeholders.

**4.2.3.4 Scope**

The scope subject group includes the processes required to identify and define the work and deliverables, and only the work and deliverables required.

**4.2.3.5 Resource**

The resource subject group includes the processes required to identify and acquire adequate project resources such as people, facilities, equipment, materials, infrastructure and tools.

**4.2.3.6 Time**

The time subject group includes the processes required to schedule the project activities and to monitor progress to control the schedule.

**4.2.3.7 Cost**

The cost subject group includes the processes required to develop the budget and to monitor progress to control costs.

**4.2.3.8 Risk**

The risk subject group includes the processes required to identify and manage threats and opportunities.

**4.2.3.9 Quality**

The quality subject group includes the processes required to plan and establish quality assurance and control.

**4.2.3.10 Procurement**

The procurement subject group includes the processes required to plan and acquire products, services or results, and to manage supplier relationships.

**4.2.3.11 Communication**

The communication subject group includes the processes required to plan, manage and distribute information relevant to the project.

**4.3 Processes****4.3.1 General**

This clause describes each of the project management processes in terms of the purpose, description, primary inputs and primary outputs.

NOTE In Tables 2 to 40, only the most common primary inputs and outputs are shown, without an indication of their importance or sequence.

Each process can be repeated to update an output of that process.

Some project-related processes may be accomplished external to the project's boundaries through an organization's policy, programme, project portfolio or other such means, as shown in Figure 6.

**EXAMPLES** Conducting feasibility studies; business case development; project selection processes prior to the actual start of project work; lessons learned from previous projects.

Although the inclusion or exclusion of these types of processes inside the project boundaries is at the discretion of the individual organizations, for the purposes of this International Standard, the following assumptions are made:

- a project starts when the performing organization completes the processes required to mandate a new project;
- a project ends when the project deliverables have been accepted or the project has been prematurely terminated, and when all project documentation is delivered and all closure activities have been completed.

The processes are presented in this International Standard as separate elements with well-defined interfaces. In practice, they overlap and interact in ways that cannot be completely detailed in this International Standard. It is recognized that there is more than one way to manage a project, depending on factors such as the objectives that are required to be achieved, risk, size, timeframe, the project team's experience, resource availability, the amount of historical information, the project management maturity of the organization, as well as industry and application area requirements.

**4.3.2 Develop project charter**

The purpose of **Develop project charter** is as follows:

- to formally authorize a project or a new project phase;
- to identify the project manager and the appropriate project manager responsibilities and authorities;
- to document the business needs, project objectives, expected deliverables and the economic aspects of the project.

The project charter links the project to the strategic objectives of the organization and should identify any appropriate terms of reference, obligations, assumptions and constraints.

The primary inputs and outputs are listed in Table 2.

**Table 2 — Develop project charter: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Project statement of work</li> <li>— Contract</li> <li>— Business case or previous phase documents</li> </ul>	<ul style="list-style-type: none"> <li>— Project charter</li> </ul>

**4.3.3 Develop project plans**

The purpose of **Develop project plans** is to document the following:

- why the project is being undertaken;
- what will be provided and by whom;
- how it will be provided;
- what it will cost;
- how the project will be implemented, controlled and closed.

Project plans normally consist of the project plan and the project management plan. These plans may be separate documents or combined into one document, but regardless of which option is chosen, the project plans should reflect the integration of scope, time, cost and other subjects.

The project management plan is a document or set of documents that defines how the project is undertaken, monitored and controlled. The project management plan may be applied to the entire project as a whole or to some part of the project through subsidiary plans, such as a risk management plan or quality management plan. Typically the project management plan defines the roles, responsibilities, organization and procedures for the management of risk, issues, change control, schedule, cost, communication, configuration management, quality, health, environment, safety and other subjects as needed.

The project plan contains baselines for carrying out the project, e.g. in terms of scope, quality, schedule, costs, resources and risks. All parts of the project plan should be consistent and fully integrated. The project plan should include outputs of all relevant project planning processes and the actions necessary to define, integrate and coordinate all appropriate efforts for implementing, controlling and closing the project. The project plan content will vary depending on the application area and complexity of the project.

At the discretion of the performing organization, through coordination with the appropriate project stakeholders, the project plan may be either a detailed document or a summary level document referencing any appropriate subsidiary plans, such as scope plan and schedule. If a summary level project plan is used, it should describe how the management of the individual subsidiary plans would be integrated and coordinated.

The project plan should always be updated and communicated to appropriate stakeholders throughout the project. However, it may start as a high-level plan. This process progressively reworks the plan from initial high-level allocations of scope, budget, resource, schedule and other items into more detailed and tightly allocated packages of work. These packages of work provide for the necessary level of management insight and control as is warranted by the project risk.

The primary inputs and outputs are listed in Table 3.

**Table 3 — Develop project plans: primary inputs and outputs**

Primary inputs	Primary outputs
— Project charter	— Project plan
— Subsidiary plans	— Project management plan
— Lessons learned from previous projects	
— Business case	
— Approved changes	

NOTE In the remainder of this International Standard “Project plans” is used to represent all plans in 4.3.3.

**4.3.4 Direct project work**

The purpose of **Direct project work** is to manage the performance of the work as defined in the project plans, in order to provide the approved project deliverables. Direct project work is the management interface between the project sponsor, project manager, project management team and project team, which enables the work performed by the project team to be integrated into subsequent project work or the final project deliverables.

The project manager should direct the performance of the planned project activities and manage the various technical, administrative and organizational interfaces within the project.

The deliverables are the result of the integrated processes performed as defined in the project plans. Information on the status of the deliverables is collected as part of 4.3.39.

The primary inputs and outputs are listed in Table 4.

**Table 4 — Direct project work: primary inputs and outputs**

Primary inputs	Primary outputs
— Project plans	— Progress data
— Approved changes	— Issues log
	— Lessons learned

**4.3.5 Control project work**

The purpose of **Control project work** is to complete project activities in an integrated manner in accordance with the project plans.

This process should be performed throughout the project and includes measuring performance, assessing measurements and trends that may affect process improvement and triggering process changes to improve performance. The continuous application of this process provides project stakeholders, including the project sponsor, project manager, project management team and project team, with an accurate and current description of project performance.

The primary inputs and outputs are listed in Table 5.

**Table 5 — Control project work: primary inputs and outputs**

Primary inputs	Primary outputs
— Project plans	— Change requests
— Progress data	— Progress reports
— Quality control measurements	— Project completion reports
— Risk register	
— Issues log	

**4.3.6 Control changes**

The purpose of **Control changes** is to control changes to the project and deliverables and to formalize acceptance or rejection of these changes before subsequent implementation.

Throughout the project it is necessary to record change requests in a change register, evaluate them in terms of benefit, scope, resources, time, cost, quality and risk, assess the impact and obtain approval prior to implementation. A change request may be modified or even cancelled in light of the impact assessment. Once the change has been approved, the decision should be communicated to all the relevant stakeholders for implementation, including updating of project documentation as appropriate. Changes to deliverables should be controlled through procedures such as configuration management.

The primary inputs and outputs are listed in Table 6.

**Table 6 — Control changes: primary inputs and outputs**

Primary inputs	Primary outputs
— Project plans	— Approved changes
— Change requests	— Change register

**4.3.7 Close project phase or project**

The purpose of **Close project phase or project** is to confirm the completion of all project processes and activities, in order to close a project phase or a project.

The completion of all processes and activities should be verified to ensure that the deliverables of the project phase or project were provided, and specific project management processes were either completed or

terminated prior to completion. All project documents should be collected and archived in accordance with the prevailing standards and all project personnel and other resources should be released.

A project may need to be terminated prior to completion, if customers no longer require the project deliverables or if it becomes obvious that some or all of the objectives cannot be met. Unless special grounds exist, terminating a project should comprise the same activities as closing a project, even though there may not be a deliverable to release to the customers. All the documentation for a terminated project should be collected and archived in accordance with organizational requirements.

The primary inputs and outputs are listed in Table 7.

**Table 7 — Close project phase or project: primary inputs and outputs**

Primary inputs	Primary outputs
— Progress reports	— Completed procurements
— Contract documentation	— Project or phase closure report
— Project completion reports	— Released resources

**4.3.8 Collect lessons learned**

The purpose of **Collect lessons learned** is to evaluate the project and collect experiences, in order to benefit current and future projects.

Throughout the project, the project team and key stakeholders identify lessons learned concerning the technical, managerial and process aspects of the project. The lessons learned should be captured, compiled, formalized, stored, disseminated and used throughout the project. Therefore, at some level lessons learned may be outputs of every project management process and may result in updated project plans.

The primary inputs and outputs are listed in Table 8.

**Table 8 — Collect lessons learned: primary inputs and outputs**

Primary inputs	Primary outputs
— Project plans	— Lessons learned document
— Progress reports	
— Approved changes	
— Lessons learned	
— Issues log	
— Risk register	

**4.3.9 Identify stakeholders**

The purpose of **Identify stakeholders** is to determine the individuals, groups or organizations affected by, or affecting, the project and to document relevant information regarding their interest and involvement.

Stakeholders may be actively involved in the project, may be internal or external to the project and may be at varying authority levels. For further information, see 3.8.

The primary inputs and outputs are listed in Table 9.

**Table 9 — Identify stakeholders: primary inputs and outputs**

Primary inputs	Primary outputs
— Project charter	— Stakeholder register
— Project organization chart	

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**4.3.10 Manage stakeholders**

The purpose of **Manage stakeholders** is to give appropriate understanding and attention to stakeholders' needs and expectations. This process includes activities such as identifying stakeholder concerns and resolving issues.

Diplomacy and tact are essential when negotiating with stakeholders. When it is not possible for the project manager to resolve stakeholder issues, it may be necessary to escalate the issues to a higher authority, in accordance with the project organization, or to elicit the assistance of external individuals.

A detailed analysis should be made of stakeholders and of the impacts they might have on the project, so that the project manager can take maximum advantage of their contribution to the project. From this process, prioritized stakeholder management plans may be developed.

The primary inputs and outputs are listed in Table 10.

**Table 10 — Manage stakeholders: primary inputs and outputs**

Primary inputs	Primary outputs
— Stakeholder register	— Change requests
— Project plans	

**4.3.11 Define scope**

The purpose of **Define scope** is to achieve clarity of the project scope, including objectives, deliverables, requirements and boundaries, by defining the end state of the project.

The definition of project scope makes clear what the project will contribute to the strategic goals of the organization. The project scope statement should be used as the basis for future project decisions, as well as for communicating the importance of the project and the benefits that should be realized by performing the project successfully.

The primary inputs and outputs are listed in Table 11.

**Table 11 — Define scope: primary inputs and outputs**

Primary inputs	Primary outputs
— Project charter	— Scope statement
— Approved changes	— Requirements

**4.3.12 Create work breakdown structure**

The purpose of **Create work breakdown structure** is to provide a hierarchical decomposition framework for presenting the work that needs to be completed, in order to achieve the project objectives.

The work breakdown structure provides a framework for dividing and subdividing the project work into smaller, thus more manageable, pieces of work. The work breakdown structure can be structured, for example, in project phases, major deliverables, discipline and location. Each descending level of the work breakdown structure describes project work in an increasingly detailed level. It is possible to develop other hierarchical breakdown structures for methodically assessing items such as deliverables, organization, risk and cost accounting of the project.

The primary inputs and outputs are listed in Table 12.



**Table 12 — Create work breakdown structure: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Project plans</li> <li>— Requirements</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Work breakdown structure</li> <li>— Work breakdown structure dictionary</li> </ul>

#### 4.3.13 Define activities

The purpose of **Define activities** is to identify, define and document all the activities that should be in the schedule and performed, in order to achieve the project objectives.

This process begins with the work breakdown structure's lowest level and it identifies, defines and documents the work through the use of smaller components, called activities, in order to provide a basis for project planning, implementing, controlling and closing work.

The primary inputs and outputs are listed in Table 13.

**Table 13 — Define activities: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Work breakdown structure</li> <li>— Work breakdown structure dictionary</li> <li>— Project plans</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Activity list</li> </ul>

#### 4.3.14 Control scope

The purpose of **Control scope** is to maximize positive and minimize negative project impacts created by scope changes.

This process should focus on determining the present project scope status, comparing the present scope status to the approved baseline scope to determine any variance, forecasting scope and implementing any appropriate change requests to avoid negative scope impacts.

This process is also concerned with influencing the factors that provide scope changes and controlling the impact of those changes on the project objectives. The process is used to ensure that all change requests are processed through 4.3.6. It is also used to manage the changes and is integrated with the other control processes. Uncontrolled changes are often referred to as project scope creep.

The primary inputs and outputs are listed in Table 14.

**Table 14 — Control scope: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Progress data</li> <li>— Scope statement</li> <li>— Work breakdown structure</li> <li>— Activity list</li> </ul>	<ul style="list-style-type: none"> <li>— Change requests</li> </ul>

#### 4.3.15 Establish project team

The purpose of **Establish project team** is to acquire the human resources needed to complete the project.

The project manager should determine how and when project team members will be acquired, as well as how and when they will be released from the project. When human resources are not available inside the

organization, consideration should be given to hiring additional resources or subcontracting work to another organization. The work location, commitment, roles and responsibilities, as well as reporting and communication requirements should be established.

The project manager may or may not have absolute control over the selection of the project team members, but the project manager should be involved in their selection. The project manager, when possible, should take into consideration factors such as skills and expertise, different personalities and group dynamics when establishing the project team. Because projects are typically performed in a changing environment, this process is normally performed continuously throughout the project.

The primary inputs and outputs are listed in Table 15.

**Table 15 — Establish project team: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Resource requirements</li> <li>— Project organization chart</li> <li>— Resource availability</li> <li>— Project plans</li> <li>— Role descriptions</li> </ul>	<ul style="list-style-type: none"> <li>— Staff assignments</li> <li>— Staff contracts</li> </ul>

**4.3.16 Estimate resources**

The purpose of **Estimate resources** is to determine the resources needed for each activity in the activity list. Resources may include people, facilities, equipment, materials, infrastructure and tools.

Attributes for resources are recorded, including origin, units and engagement start and end.

The primary inputs and outputs are listed in Table 16.

**Table 16 — Estimate resources: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Activity list</li> <li>— Project plans</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Resource requirements</li> <li>— Resource plan</li> </ul>

**4.3.17 Define project organization**

The purpose of **Define project organization** is to secure all needed commitments from all the parties involved in a project. Roles, responsibilities and authorities that are relevant to the project should be defined in accordance with the project’s nature and complexity and should consider the performing organization’s existing policies.

The definition of the project organizational structure includes the identification of all team members and other persons directly involved in the project work.

This process includes the assignment of project responsibilities and authorities. These responsibilities and authorities may be defined at the appropriate levels of the work breakdown structure. Those definitions usually include responsibilities to perform the approved work, manage progress and allocation of resources.

The primary inputs and outputs are listed in Table 17.

**Table 17 — Define project organization: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Project plans</li> <li>— Work breakdown structure</li> <li>— Resource requirements</li> <li>— Stakeholder register</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Role descriptions</li> <li>— Project organization chart</li> </ul>

#### 4.3.18 Develop project team

The purpose of **Develop project team** is to improve the performance and interaction of team members in a continuing manner. This process should enhance team motivation and performance.

This process depends on the competencies of the project team (see also 4.3.15). Ground rules of acceptable behaviour should be established early in the project to minimize misunderstandings and conflicts.

The primary inputs and outputs are listed in Table 18.

**Table 18 — Develop project team: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Staff assignments</li> <li>— Resource availability</li> <li>— Resource plan</li> <li>— Role descriptions</li> </ul>	<ul style="list-style-type: none"> <li>— Team performance</li> <li>— Team appraisals</li> </ul>

#### 4.3.19 Control resources

The purpose of **Control resources** is to ensure that the resources required to undertake the project work are available and assigned in the manner necessary, in order to meet the project requirements.

Conflicts in availability of resources may occur due to unavoidable circumstances such as equipment failure, weather, labour unrest or technical problems. Such circumstances may require rescheduling of activities resulting in a change of resource requirements for current or subsequent activities. Procedures should be established to identify such shortages to facilitate the reallocation of resources.

The primary inputs and outputs are listed in Table 19.

**Table 19 — Control resources: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Project plans</li> <li>— Staff assignments</li> <li>— Resource availability</li> <li>— Progress data</li> <li>— Resource requirements</li> </ul>	<ul style="list-style-type: none"> <li>— Change requests</li> <li>— Corrective actions</li> </ul>

#### 4.3.20 Manage project team

The purpose of **Manage project team** is to optimize team performance, provide feedback, resolve issues, encourage communication and coordinate changes, in order to achieve project success.

As a result of managing the project team the resource requirements may be revised. Issues should be raised and input provided for organizational personnel performance appraisals and project lessons learned.

The primary inputs and outputs are listed in Table 20.

**Table 20 — Manage project team: primary inputs and outputs**

Primary inputs	Primary outputs
— Project plans	— Staff performance
— Project organization chart	— Staff appraisals
— Role descriptions	— Change requests
— Progress data	— Corrective actions

**4.3.21 Sequence activities**

The purpose of **Sequence activities** is to identify and document the logical relationships between project activities.

All activities within the project should be with dependencies to provide a network diagram such that the critical path may be determined. Activities should be logically sequenced with proper precedence relationships and appropriate leads, lags, constraints, interdependencies and external dependencies, in order to support development of a realistic and achievable project schedule.

The primary inputs and outputs are listed in Table 21.

**Table 21 — Sequence activities: primary inputs and outputs**

Primary inputs	Primary outputs
— Activity list	— Activity sequence
— Approved changes	

**4.3.22 Estimate activity durations**

The purpose of **Estimate activity durations** is to estimate the time required to complete each activity in the project.

Activity durations are a function of subjects such as quantity and type of resources available, relationship between activities, capacities, planning calendars, learning curves and administrative processing. Administrative processing may affect approval cycles. Future activities may consist of work that will be broken down into more detail as time progresses and more detailed information becomes available. Durations most frequently represent a trade-off between time constraints and resource availability. Periodic re-estimates that result in updated forecasting against the baseline is also a component of this process

Activity duration estimates may need to be revisited once the activities are scheduled and the critical path is identified. If the critical path reveals a completion date of the project later than the required completion date, activities on the critical path may need to be adjusted.

The primary inputs and outputs are listed in Table 22.

**Table 22 — Estimate activity durations: primary inputs and outputs**

Primary inputs	Primary outputs
— Activity list	— Activity duration estimates
— Resource requirements	
— Historical data	
— Industry standards	
— Approved changes	

#### 4.3.23 Develop schedule

The purpose of **Develop schedule** is to calculate the start and end times of the project activities and to establish the overall project schedule baseline.

Activities are scheduled in a logical sequence that identifies durations, milestones and interdependencies to provide a network.

The activity level provides sufficient resolution for management control throughout the project life cycle. The schedule provides a vehicle for evaluating actual progress in time against a predefined objective measurement of achievement.

The schedule is established at the activity level, which provides the basis for assigning resources and developing the time-based budget. Schedule development should continue throughout the project as work progresses, as the project plans change, as anticipated risk events occur or disappear and as new risks are identified. If necessary, duration and resource estimates should be reviewed and revised to develop an approved project schedule that can serve as the baseline against which progress may be tracked.

The primary inputs and outputs are listed in Table 23.

**Table 23 — Develop schedule: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Activity sequence</li> <li>— Activity duration estimates</li> <li>— Schedule constraints</li> <li>— Risk register</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Schedule</li> </ul>

#### 4.3.24 Control schedule

The purpose of **Control schedule** is to monitor schedule variances and to take appropriate actions.

This process should focus on determining the current status of the project schedule, comparing it to the approved baseline schedule to determine any variance, forecasting completion dates and implementing any appropriate actions to avoid adverse schedule impacts. All changes to the baseline schedule should be managed in accordance with 4.3.6.

Forecasts of schedules at completion should be routinely developed and updated based on past trends and current knowledge.

The primary inputs and outputs are listed in Table 24.

**Table 24 — Control schedule: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Schedule</li> <li>— Progress data</li> <li>— Project plans</li> </ul>	<ul style="list-style-type: none"> <li>— Change requests</li> <li>— Corrective actions</li> </ul>

#### 4.3.25 Estimate costs

The purpose of **Estimate costs** is to obtain an approximation of the costs needed to complete each project activity and for the project as a whole.

Cost estimates can be expressed in terms of units of measure such as labour hours or number of equipment hours or in currency valuations. When expressed in currency and when performance spans a long period of

time, methods taking into account the time value of money should be used. Learning curves may be used when the project includes a number of repetitive and sequential activities. Projects dealing in more than one currency should identify the exchange rates used in costing the project plan.

Reserves or contingency estimates are used to deal with risks or uncertainties and should be added to the project cost estimates and clearly identified.

The primary inputs and outputs are listed in Table 25.

**Table 25 — Estimate costs: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Work breakdown structure</li> <li>— Activity list</li> <li>— Project plans</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Cost estimates</li> </ul>

**4.3.26 Develop budget**

The purpose of **Develop budget** is to distribute the project’s budget to the appropriate levels of the work breakdown structure.

The assignment of budgets to scheduled segments of work provides a time-based budget against which actual performance can be compared. Maintaining realistic budgets, directly tied to an established scope of work, is essential for each organization responsible for performing project effort. The budgets are normally distributed in the same manner in which the project estimate was derived. Project cost estimating and budgeting are closely linked. Cost estimating determines the total cost of the project, whereas budgeting identifies where and when costs will be expended and establishes a means whereby performance can be managed.

Objective measures of cost performance should be established in the budgeting process. Setting the objective measures in advance of cost performance assessments enhances accountability and avoids bias.

Reserves or contingency items not assigned to activities or other work scope may be created and used for management control purposes or to cover identified risks. Such items and the associated risk should be clearly identified.

The primary inputs and outputs are listed in Table 26.

**Table 26 — Develop budget: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Work breakdown structure</li> <li>— Cost estimates</li> <li>— Schedule</li> <li>— Project plans</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Budget</li> </ul>

**4.3.27 Control costs**

The purpose of **Control costs** is to monitor cost variances and to take appropriate actions.

This process should focus on determining the present project cost status, comparing it to the baseline costs to determine any variance, forecasting projected costs at completion and implementing any appropriate preventive or corrective actions, in order to avoid adverse cost impacts. All changes to the baseline costs should be managed in accordance with 4.3.6.

Once work is started, performance data are accumulated including budgeted costs, actual costs and estimated cost at completion. In order to evaluate cost performance it is necessary to accumulate scheduling data, such as the progress of scheduled activities and the forecasted completion dates of current and future activities. Variances might arise from poor planning, unforeseen scope changes, technical problems, equipment failures or other external factors, such as supplier difficulties. Regardless of the cause, corrective actions require either a change in the cost baseline or the development of a short-term recovery plan.

The primary inputs and outputs are listed in Table 27.

**Table 27 — Control costs: primary inputs and outputs**

Primary inputs	Primary outputs
— Progress data	— Actual costs
— Project plans	— Forecasted costs
— Budget	— Change requests
	— Corrective actions

**4.3.28 Identify risks**

The purpose of **Identify risks** is to determine potential risk events and their characteristics that, if they occur, may have a positive or negative impact on the project objectives.

This is a repeatable process because new risks may become known or risks may change as the project progresses through its life cycle. Risks with a potential negative impact to the project are referred to as “threats”, whereas risks with a potential positive impact on the project are referred to as “opportunities”. All identified risks should be addressed in accordance with 4.3.30.

This process should involve multiple participants, typically the project customers, project sponsor, project manager, project management team, project team, senior managers, users, risk management experts, other members of the project steering committee and subject matter experts.

The primary inputs and outputs are listed in Table 28.

**Table 28 — Identify risks: primary inputs and outputs**

Primary inputs	Primary outputs
— Project plans	— Risk register

**4.3.29 Assess risks**

The purpose of **Assess risks** is to measure and prioritize the risks for further action.

This process includes estimating the probability of occurrence of each risk and the corresponding consequence for project objectives, if the risk does occur. The risks are then prioritized in accordance with this assessment considering other factors such as the timeframe and key stakeholders’ risk tolerance.

Risk assessment is a repetitive process in accordance with 4.3.31. Trends can indicate the need for more or less risk management action.

The primary inputs and outputs are listed in Table 29.

**Table 29 — Assess risks: primary inputs and outputs**

Primary inputs	Primary outputs
— Risk register	— Prioritized risks
— Project plans	

**4.3.30 Treat risks**

The purpose of **Treat risks** is to develop options and determine actions to enhance opportunities and reduce threats to project objectives.

This process addresses risks by inserting resources and activities into the budget and schedule. Risk treatment should be appropriate to the risk, cost-effective, timely, realistic within the project context, understood by all parties involved and assigned to an appropriate person.

Risk treatment includes measures to avoid the risk, to mitigate the risk, to deflect the risk or to develop contingency plans to be used if the risk occurs.

The primary inputs and outputs are listed in Table 30.

**Table 30 — Treat risks: primary inputs and outputs**

Primary inputs	Primary outputs
— Risk register	— Risk responses
— Project plans	— Change requests

**4.3.31 Control risks**

The purpose of **Control risks** is to minimize disruption to the project by determining whether the risk responses are executed and whether they have the desired effect.

It is achieved by tracking the identified risks, identifying and analysing new risks, monitoring trigger conditions for contingency plans and reviewing progress on risk treatments while evaluating their effectiveness.

Project risks should be periodically evaluated throughout the project life cycle, when a new risk arises or when a milestone is reached.

The primary inputs and outputs are listed in Table 31.

**Table 31 — Control risks: primary inputs and outputs**

Primary inputs	Primary outputs
— Risk register	— Change requests
— Progress data	— Corrective actions
— Project plans	
— Risk responses	

**4.3.32 Plan quality**

The purpose of **Plan quality** is to determine the quality requirements and standards that will be applicable to the project, the deliverables of the project and how the requirements and standards will be met based on the project objectives.

This process includes the following:

- determining and agreeing with the project sponsor and other stakeholders as to the objectives and relevant standards to be achieved;
- establishing the tools, procedures, techniques and resources necessary to achieve the relevant standards;
- determining methodologies, techniques and resources to implement the planned systematic quality activities;
- developing the quality plan which includes type of reviews, responsibilities and participants in a timetable in accordance with the project overall schedule;



- consolidating all quality information in the quality plan.

Due to the temporary nature of projects and their time constraints, most projects do not have the ability to develop quality standards. Development and organizational acceptance of quality standards and product quality parameters may be outside of the project boundaries. This acceptance is normally the responsibility of the performing organization and serves as input to this process. The quality plan should refer to or include the quality policy as established by senior management.

The primary inputs and outputs are listed in Table 32.

**Table 32 — Plan quality: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Project plans</li> <li>— Quality requirements</li> <li>— Quality policy</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Quality plan</li> </ul>

#### 4.3.33 Perform quality assurance

The purpose of **Perform quality assurance** is to review the deliverables and the project. It includes all processes, tools, procedures, techniques and resources necessary to meet quality requirements.

This process includes the following:

- ensuring objectives and relevant standards to be achieved are communicated, understood, accepted and adhered to by the appropriate project organization members;
- executing the quality plan as the project progresses;
- ensuring that the established tools, procedures, techniques and resources are being used.

Quality assurance permits conformance to applicable performance requirements and standards.

Quality assurance audits may be performed outside the project boundaries by other parts of the performing organization or by the customers. Audits determine the performance of the quality process, quality control and the need for recommended action or change requests.

The primary inputs and outputs are listed in Table 33.

**Table 33 — Perform quality assurance: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Quality plan</li> </ul>	<ul style="list-style-type: none"> <li>— Change requests</li> </ul>

#### 4.3.34 Perform quality control

The purpose of **Perform quality control** is to determine whether the established project objectives, quality requirements and standards are being met and to identify causes of, and ways to eliminate, unsatisfactory performance.

This process should be applied during the whole project life cycle and includes the following:

- monitoring the quality of the deliverables and processes is being met and detecting defects by using the established tools, procedures and techniques;
- analysing possible causes of defects;
- determining the preventive actions and change requests;

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- communicating the corrective actions and change requests to the appropriate project organization members.

Quality control may be performed outside the project boundaries by other parts of the performing organization or by the customers. Quality control may identify causes of poor process performance or product quality and may result in recommended actions or change requests, when necessary to eliminate non-conforming performance.

The primary inputs and outputs are listed in Table 34.

**Table 34 — Perform quality control: primary inputs and outputs**

Primary inputs	Primary outputs
— Progress data	— Quality control measurements
— Deliverables	— Verified deliverables
— Quality plan	— Inspection reports
	— Change requests
	— Corrective actions

#### 4.3.35 Plan procurements

The purpose of **Plan procurements** is to plan and document the procurement strategy and overall process properly before procurement is initiated.

This process is used to facilitate procurement decision-making, to specify procurement approaches and to develop procurement specifications and requirements.

The primary inputs and outputs are listed in Table 35.

**Table 35 — Plan procurements: primary inputs and outputs**

Primary inputs	Primary outputs
— Project plans	— Procurement plan
— In-house capacity and capability	— Preferred suppliers list
— Existing contracts	— Make-or-buy decision list
— Resource requirements	
— Risk register	

#### 4.3.36 Select suppliers

The purpose of **Select suppliers** is as follows:

- to ensure that information is obtained from suppliers so that there is consistent evaluation of proposals against stated requirements;
- to review and examine all the submitted information;
- to select the suppliers.

The request for information, proposal, bid, offer or quotation, each of which serves different purposes, should be unambiguous, in order to ensure that the information obtained in response to the specific type of request meets the needs of the customers and complies with applicable legal and regulatory requirements. The request should include a full description of the documents to be provided, such as scope, format, quality and quantity of these documents, as well as their purpose and the date by which they should be submitted. When proposals are requested, the submitted documentation should provide sufficient information for a supplier to be selected.

An evaluation of each supplier’s offer should be undertaken in accordance with the chosen evaluation criteria. The final selection should be made based on what is considered to be the most appropriate and beneficial offer

with reference to the evaluation criteria. There may be a period of negotiation between selecting a preferred supplier and agreeing on the final agreement conditions.

The primary inputs and outputs are listed in Table 36.

**Table 36 — Select suppliers: primary inputs and outputs**

Primary inputs	Primary outputs
— Procurement plan	— Request for information, proposal, bid, offer or quotation
— Preferred suppliers list	— Contracts or purchase orders
— Supplier's tenders	— Selected suppliers list
— Make-or-buy decision list	

#### 4.3.37 Administer procurements

The purpose of **Administer procurements** is to manage the relationship between the buyer and the suppliers.

This process includes monitoring and reviewing the suppliers' performance and receipt of regular progress reports, and taking appropriate action to promote compliance with all the project requirements, including contract types, quality, performance, timeliness and safety.

This process starts with issuance of the agreement documentation and ends with agreement closure.

The primary inputs and outputs are listed in Table 37.

**Table 37 — Administer procurements: primary inputs and outputs**

Primary inputs	Primary outputs
— Contracts or purchase orders	— Change requests
— Project plans	— Corrective actions
— Approved changes	
— Inspection reports	

#### 4.3.38 Plan communications

The purpose of **Plan communications** is to determine the information and communication needs of the stakeholders.

Although projects have the need to communicate project information, the information needs and methods of distribution vary. Factors for project success include identification of the information needs of the stakeholders and any mandated information needs, e.g. government or regulatory, and determining a suitable means of meeting those needs.

Factors such as geographically dispersed personnel, multiple cultures and organizational factors may significantly affect communication requirements. For further information, see 3.5.1.

This process should begin early in the planning of the project, following a stakeholder identification and analysis, and should be regularly reviewed and revised as needed, in order to ensure continued effectiveness throughout the project. The communications plan defines the information requirements and should be easily accessible by the appropriate stakeholders throughout the project.

The primary inputs and outputs are listed in Table 38.

**Table 38 — Plan communications: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Project plans</li> <li>— Stakeholder register</li> <li>— Role descriptions</li> <li>— Approved changes</li> </ul>	<ul style="list-style-type: none"> <li>— Communications plan</li> </ul>

**4.3.39 Distribute information**

The purpose of **Distribute information** is to make required information available to project stakeholders, as defined by the communications plan, and to respond to unexpected, specific requests for information.

Organizational policies, procedures and other information may be amended, provided or affected as a result of this process.

The primary inputs and outputs are listed in Table 39.

**Table 39 — Distribute information: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Communications plan</li> <li>— Progress reports</li> <li>— Unexpected requests</li> </ul>	<ul style="list-style-type: none"> <li>— Distributed information</li> </ul>

**4.3.40 Manage communications**

The purpose of **Manage communications** is to ensure that the communication needs of the project stakeholders are satisfied and to resolve communication issues if and when they arise.

Success or failure of a project may depend on how well the various project team members and stakeholders communicate with each other. This process should focus on the following:

- increasing the understanding and cooperation among the various stakeholders through good communications;
- providing timely, accurate and unbiased information;
- resolving communication issues to minimize the risk that the project is negatively affected by unknown or unresolved stakeholder issues or misunderstandings.

The primary inputs and outputs are listed in Table 40.

**Table 40 — Manage communications: primary inputs and outputs**

Primary inputs	Primary outputs
<ul style="list-style-type: none"> <li>— Communications plan</li> <li>— Distributed information</li> </ul>	<ul style="list-style-type: none"> <li>— Accurate and timely information</li> <li>— Corrective actions</li> </ul>

## **Annex A**

### **(informative)**

### **Process group processes mapped to subject groups**

Figures A.1 to A.5 illustrate the interactions of the individual processes in each process group identified in 4.2.2 mapped to the subject groups identified in 4.2.3. Not all process interactions are illustrated and the interactions illustrated represent only one possible logical view of the processes.

The arrows represent one logical sequence of processes. The decision as to which processes are required and in what sequence is taken by the organization, the project manager, the project management team or the project team. Any process may be repeated.

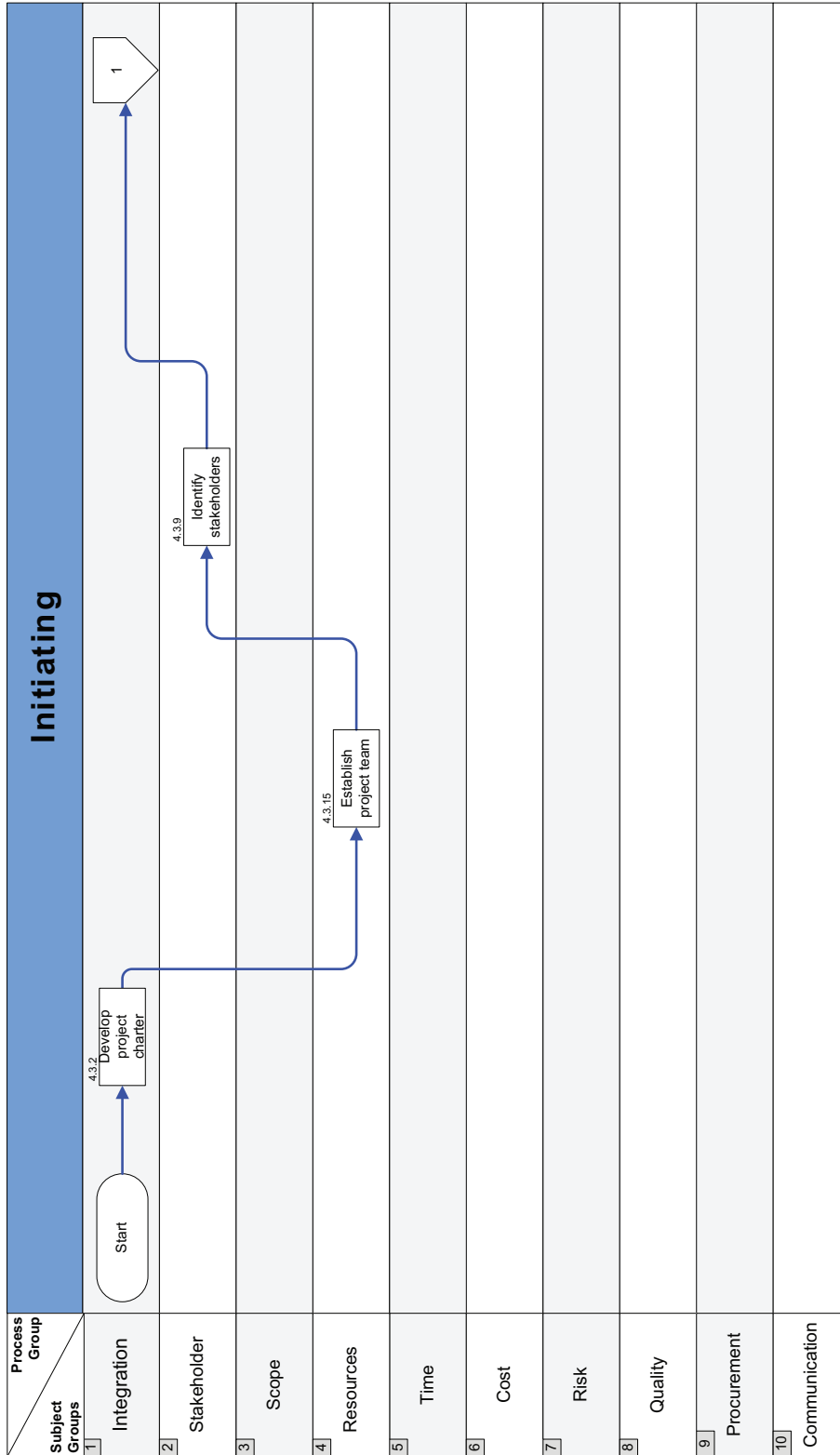


Figure A.1 — Initiating process group processes

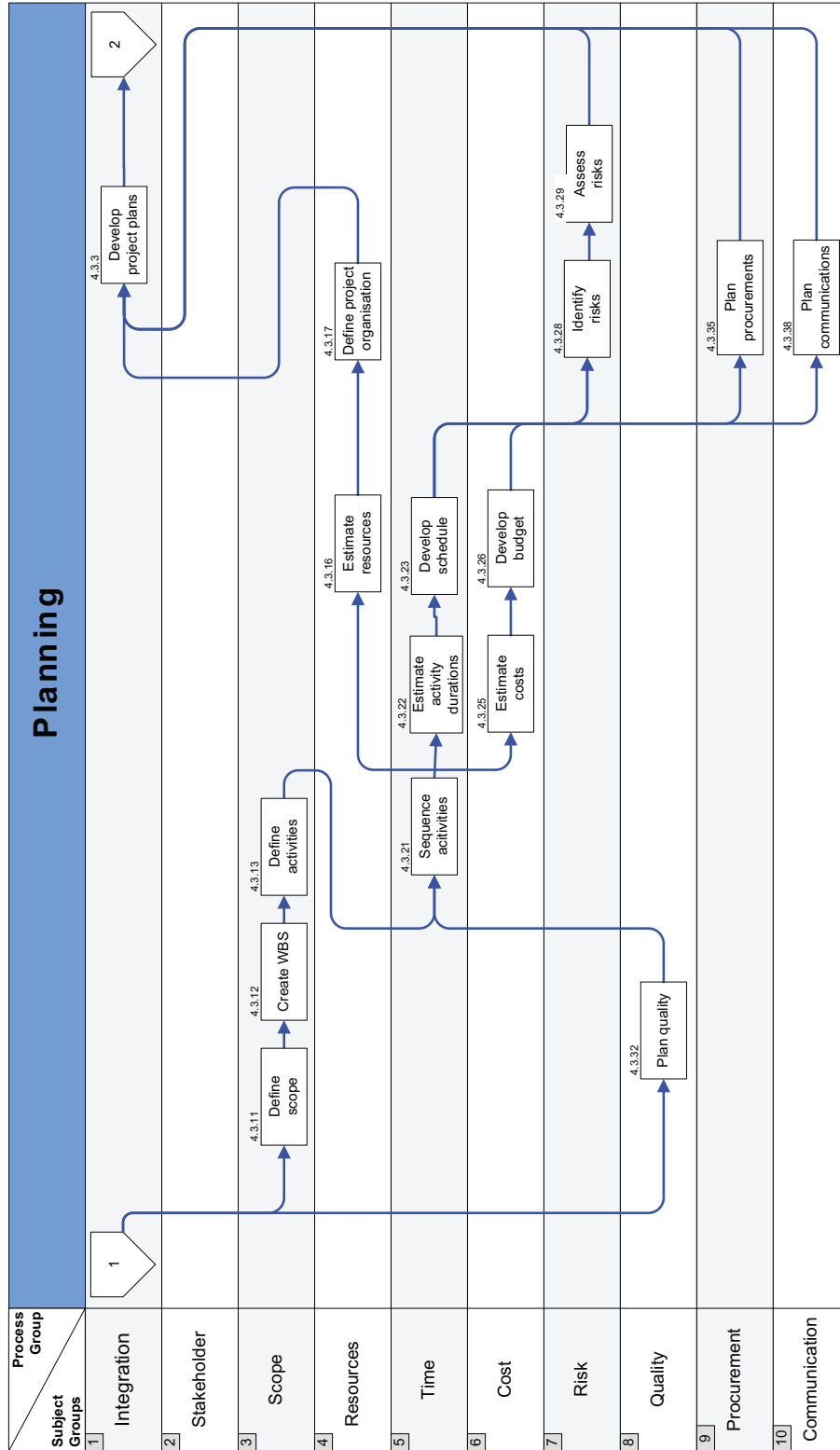


Figure A.2 — Planning process group processes

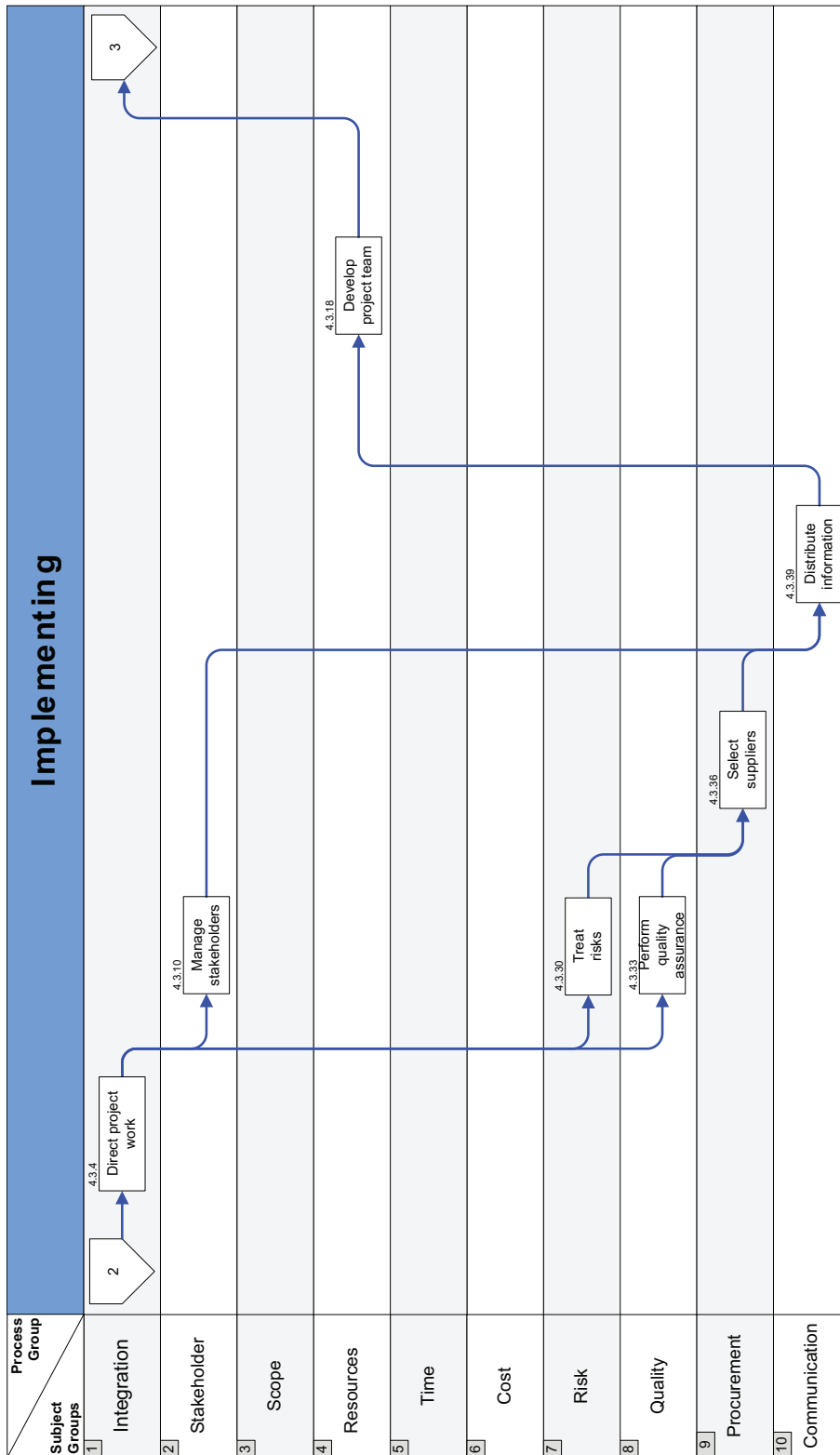


Figure A.3 — Implementing process group processes



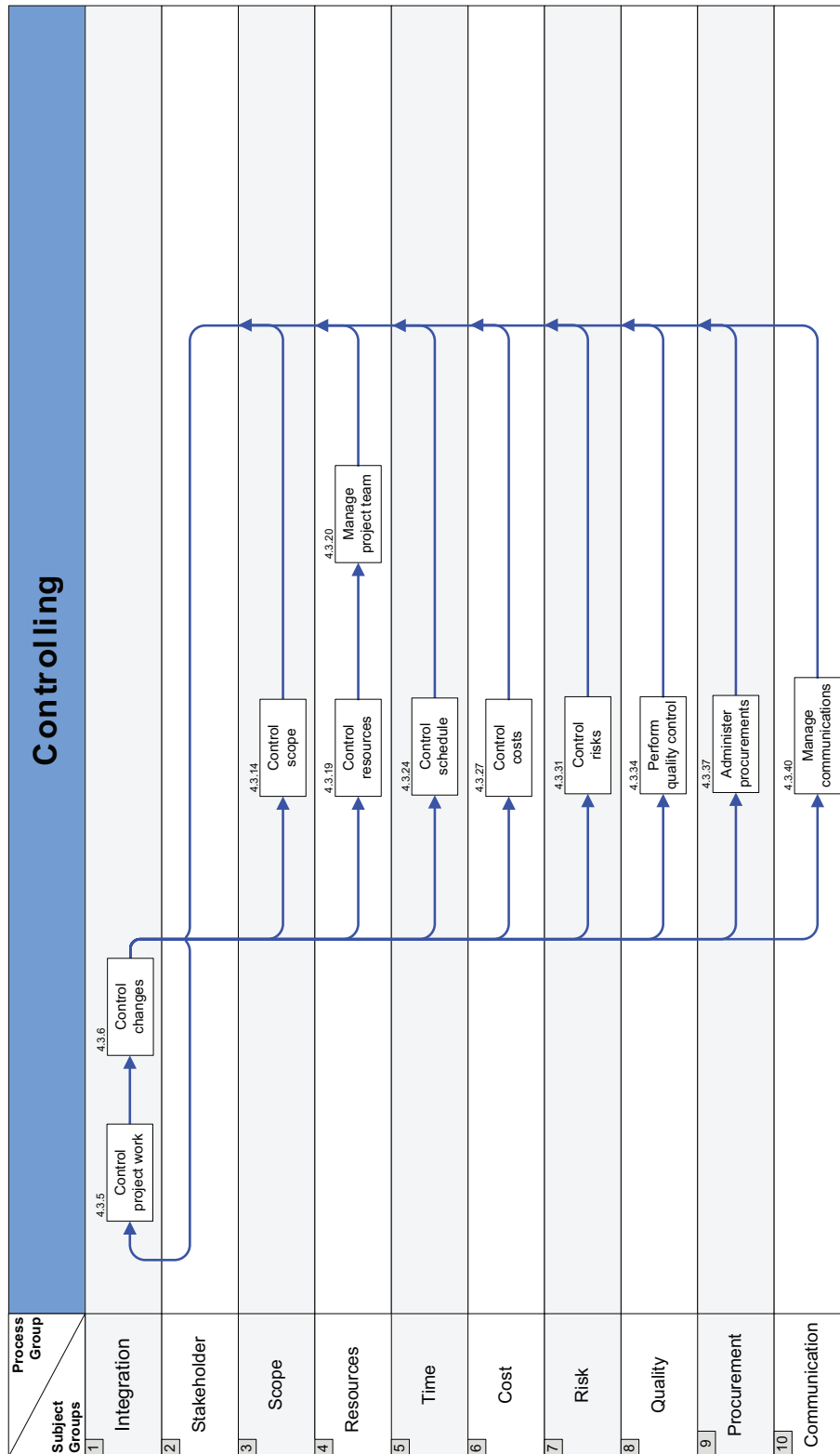


Figure A.4 — Controlling process group processes

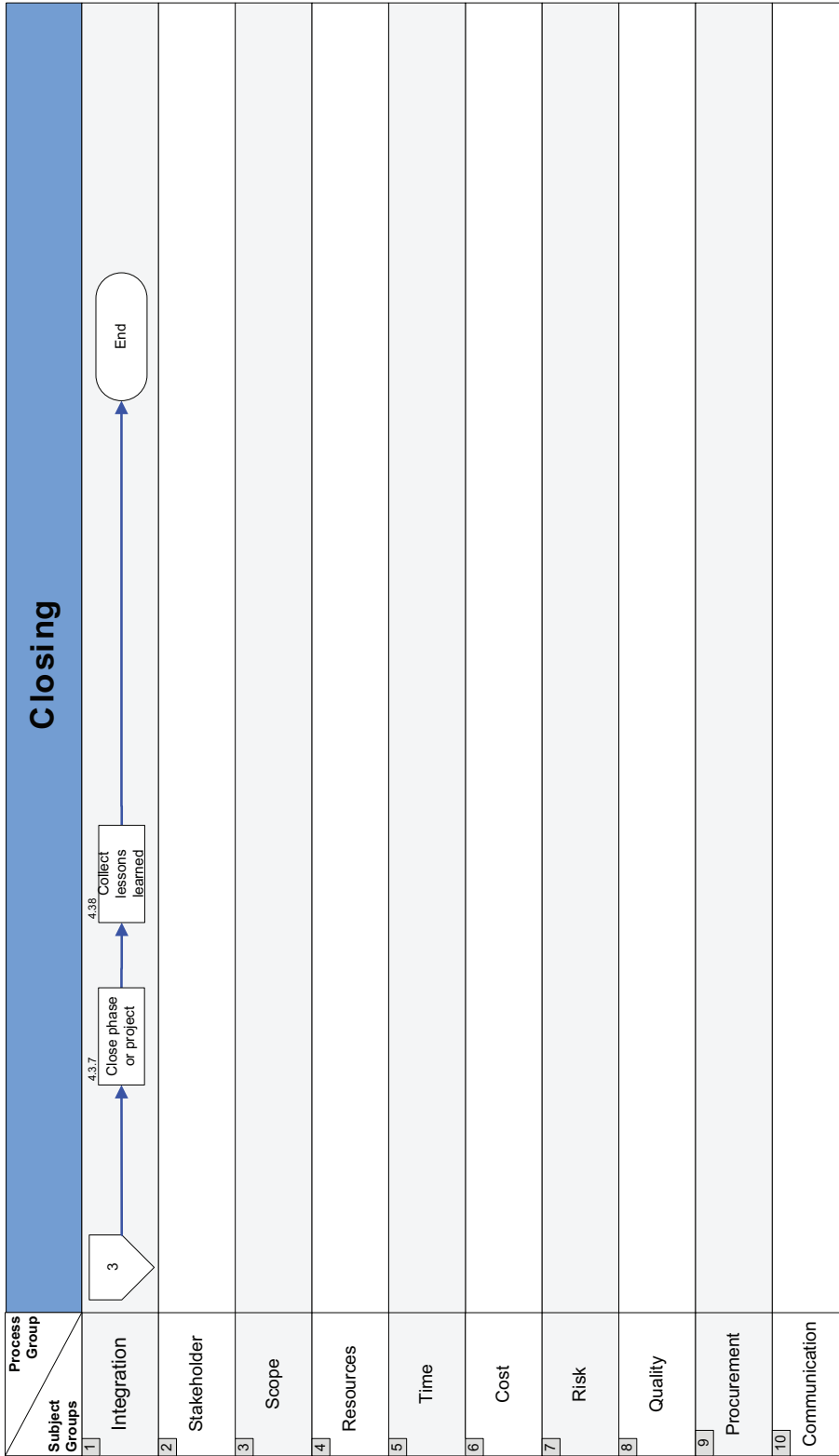


Figure A.5 — Closing process group processes



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