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ISS international INTEGRATED SERVICE SOLUTIONS

PMCs

Project Management Consultancy Service

INDEX

1. FOREWORD

The Project Management Consultancy (PMC) Standard Practice, is the general framework adopted by ISS International for managing and controlling activities and processes either internals or on behalf of its Clients.

The primary purpose of the PMC is to ensure that all Project Team members have a clear understanding of what they are required to do, how they should to do it and by when. The PMC includes a general guidance for the Field Development Process, a systematic application of best practices and a mechanism of continuous improvement.

The main objective of the PMC is to strengthen the Development of ISS's projects, either internal or on behalf of Clients, by:

- embracing a decision driven process that maximises value creation;
- streamlining the process by performing activities in parallel;
- applying extensively internationally-recognised best practices to increase effectiveness;
- aligning language to industry terminology;
- introducing flexibility to allow different projects to be "tailored to fit"; building integrated multifunctional Project Teams;
- capturing know-how to capitalise on lessons learned.

The PMC covers the entire Field Development Process, starting with the identification of an opportunity and its evaluation (e.g. from the first discovery of a hydrocarbons reservoir with an exploration well). It includes the selection, definition and execution of a project and ends shortly after the production start-up (typically after 6-24 months).

The PMC also considers the strong relationships between Exploration, Development and Production processes and provides optimised practices to enable mutual interactions and integration in all phases.

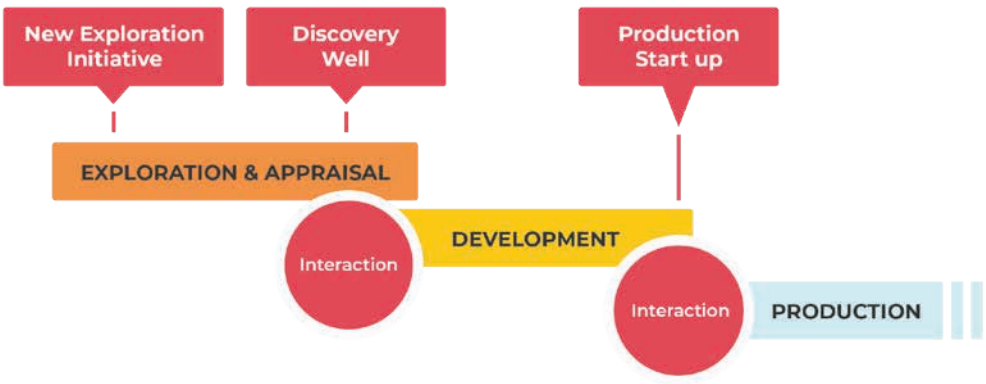


Figure 1.1. PMC Framework

2. PROJECT MANAGEMENT CONSULTANCY

The Project Management Consultancy (PMC) system is one of the subsystems that constitute the ISS Management System. The Project Management Consultancy (PMC) System incorporates Project Management practices into a set of documents, guidelines and tools, to provide a formal mechanism for managing and controlling activities on the project.

2.1 PMC SCOPE AND OBJECTIVES

The primary scope of the Project Management Consultancy System is to provide a mechanism for defining, managing and controlling activities within the Field Development Project Phases, thereby ensuring that all personnel have a clear understanding of what they are required to do, how they have to do it, and by when.
The PMC therefore provides assurance to the Company and its stakeholders that the activities of the Project Management Team are being properly controlled and that risks are being effectively managed.
The PMC is not intended to be a fully prescriptive system, which attempts to formalise and document every activity on the project. The PMC provides a framework, and defines only those processes and procedures which need to be undertaken in a defined, standardized Way.

2.2 HANDBOOK SCOPE

PMC Handbook defines the processes, activities and technicalities of the PMC. The handbook is a top level framework document explaining how management control is exercised within the Project and providing extensive references to other more detailed guidelines and tools. It explains, in high level terms, the principles of guidelines, and the tools that project teams should use in performing their job. This handbook has been developed with the aim of providing the Development Project Manager-and project Team with a practical guide to the activities to be performed.

3. PROJECT MANAGEMENT CONSULTANCY (PMC) SYSTEM STRUCTURE

The following set of documents makes up the Project Management Consultancy System:
Project Management Standard Practice (referred to as the PMC): The PMC Standard Practice is the second level document in the ISS Management Consultancy System. It is essentially a framework document and provides extensive references to other more detailed documents within the management system. It contains what the Project Team has to do in a Development Project in terms of Project Management activities.
Guidelines: guidelines are detailed explanations of how and when to perform the processes that make up the various Project Management areas (Project Framing, Team, Management, Project Administration etc...). Where necessary, guidelines make reference to specific tools, such as software or electronic spreadsheets that Development Project Teams can use in performing activities. Guidelines indicate which deliverables are to be produced during the Project Lifecycle. Some guidelines explain specific processes (Stakeholder Management, Contracting Strategy...), others indicate how to produce specific deliverables (PSOS, PDP...).
Frame Procedures: Frame Procedures are flow-chart documents which identify who is in charge of performing key steps of the processes described in the guidelines. A Frame Procedure is usually attached to a guideline as a suggestion that should be customised for each Project.
Tools: the term “tool” refers to ail electronic supports employed by the Development Project Team. Guidelines refer to specific tools provided bribe Company for carrying out certain activities. Guidelines might also suggest the customisation of Databases or Spreadsheets within individual Projects (Permits and Consents Register, Interface Register, Change Register...).

4. PROJECT MNG CONSULTANCY (PMC) SYSTEM GUIDING PRINCIPLES

The .PMS is based on some guiding principles. The following scheme highlights those principles that are at the heart of the FMS.

Aligned with international best practices: The PMS make use of commonly recognised industry best practices.
Team Based: The PMS is based on multifunctional integrated team, where information exchange and know-how sharing are leveraged.. PMS recognises that all relevant functions should be actively involved in the Project Management processes and it sets each participation level according to the project phase and activity.
Standardisation of terminology: The PMS make sure that the Company speaks a common language and is aligned with international industry terminology. This leads to optimise communication at every step of the process.
Flexibility: The PMS embeds the necessary flexibility for effectively managing different projects in terms of complexity, costs. and Investments difficulty.

4.1 APPLICABILITY

The PMS Standard Practice is applicable to all type of projects, either green field or brown field, that pass through the ISS Project Development System.
The PMS Standard Practice applies to all activities and processes performed by or on behalf of the Project Team, including any work carried out at suppliers and contractors' own locations. In practice, major contractors and suppliers will have their own Management Systems but these shall be compatible with the relevant requirements of the PMS.
Moreover the PMS standard practice be also considered applicable to projects or activities not strictly related to hydrocarbon discovery (i.e. new information technology projects etc...).

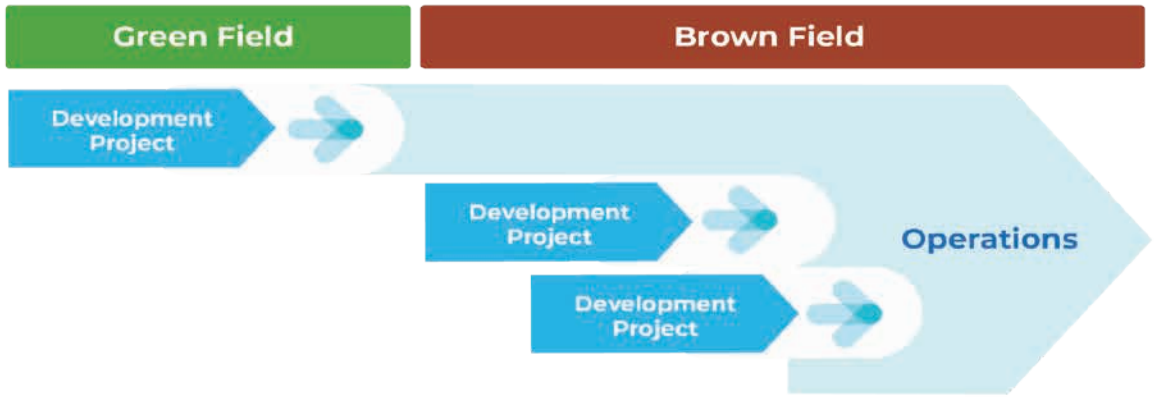


Figure 4.1. PMC Applicability

4.2 MANUAL ADMINISTRATION

The PMS Handbook is a living document, capturing valuable experience and contributions from all parts the ISS International organisation. Improvement and update of the Handbook contents is managed using two co-ordinated processes:

- Revision contents acquisitions
- Handbook revision release

5. PROJECT MANAGEMENT OVERVIEW

5.1 INTRODUCTION

Every organisation or program creates and implements projects to help it move toward its goals. Every assigned project manager wants to be successful in executing assigned projects, and a number of standard practices exist to assist and guide the project manager (PM).

5.1.1 WHAT IS A PROJECT?

A Project is a process that transforms an opportunity jn an asset. A Project has three main. Characteristics:

- It is a unique effort to reach a unique goal
- It has defined time-limits
- It is organised in a complex and multidisciplinary way

Although this handbook is generally applicable to all kind of Projects, it has-been designed to be used for Development Projects. For ISS International the term “Development Project”. refers to all activities undertaken to realise wells, plants, platforms necessary for the development, exploitation and start-up of a business opportunity.

5.1.2 WHAT IS A SUCCESSFUL PROJECT?

A Project may finish on schedule and on budget, but will not be successful unless all its objectives are met. Project objectives must therefore be clearly defined and agreed upon by the DPM and the Client. Some Projects focus more on respecting schedules, while others pay particular attention to respecting budget. Generally speaking, a successful Project should produce the following results:

- The Client is satisfied with the final deliverable: (product, service, process or plan)
- The Client is supplied with the deliverable on time
- The Project Team respected budget and staffing allocations
- Team members have increased their skills and knowledge as a result of the Project
- The organisation has benefited from the lessons learned by the Team

5.1.3 WHAT IS PROJECT MANAGEMENT?

Project Management is the application of knowledge skills, techniques, and tools to Project activities to meet Project requirements. It enables the project Team to optimally plan, execute and control the complex interconnected activities on which the Development process is based. Its objective is to ensure completion of the project on schedule, within budget, in accordance with an agreed specification and with all objectives met.

Projects rarely succeed by themselves. They must have specific support from management, general support from the organisation, and appropriate participation from the Partners. To be successful, projects must also have:

- A responsible and empowered manager to drive, direct, and monitor all project activities: the "Project Manager" (also Development Project Manager)
- An integrated, qualified and motivated Project Team

5.1.4 THE PROJECT MANAGER (PM)

The (Development) Project Manager is the process owner for project development. She/he is responsible for meeting project objectives for all project phases.

The main responsibilities of the PM are to:

- Ensure value maximisation by using best practices within a Development Project
- Co-ordinate, empower and motivate allocated resources
- Ensure that all activities in all project phases are correctly defined, planned, executed, monitored and closed-out

The selection of a PM has a major effect on project success. The PM should have the skills, knowledge, and personality necessary to bring the project to fruition. Among the most important attributes of a PM are:

- Communications skills
- Organisational skills -
- Budgeting skills
- Problem-solving skills
- Negotiating skills
- Team leading / resource management skills

In this document, the terms “Development Project Manager” and “Project Manager’ are used synonymously.

5.1.5 PROJECT TEAM

The Project Team is a constantly evolving combination of differently skilled resources (technical and functional) selected as and when required, to aid the DPM in achieving Project Objectives. It is fundamental that all Project Team members be aware of those objectives.
The DPM should encourage positive interaction among resources so that the Development Project experience proves a positive one for each team member.

5.1.6 PROJECT LIFE CYCLE

Project life cycles are usually performed in phases. The Development Project Process is divided into the following five phases:

- Evaluation
- Concept Selection
- Concept Definition
- Execution
- Production and Close-out

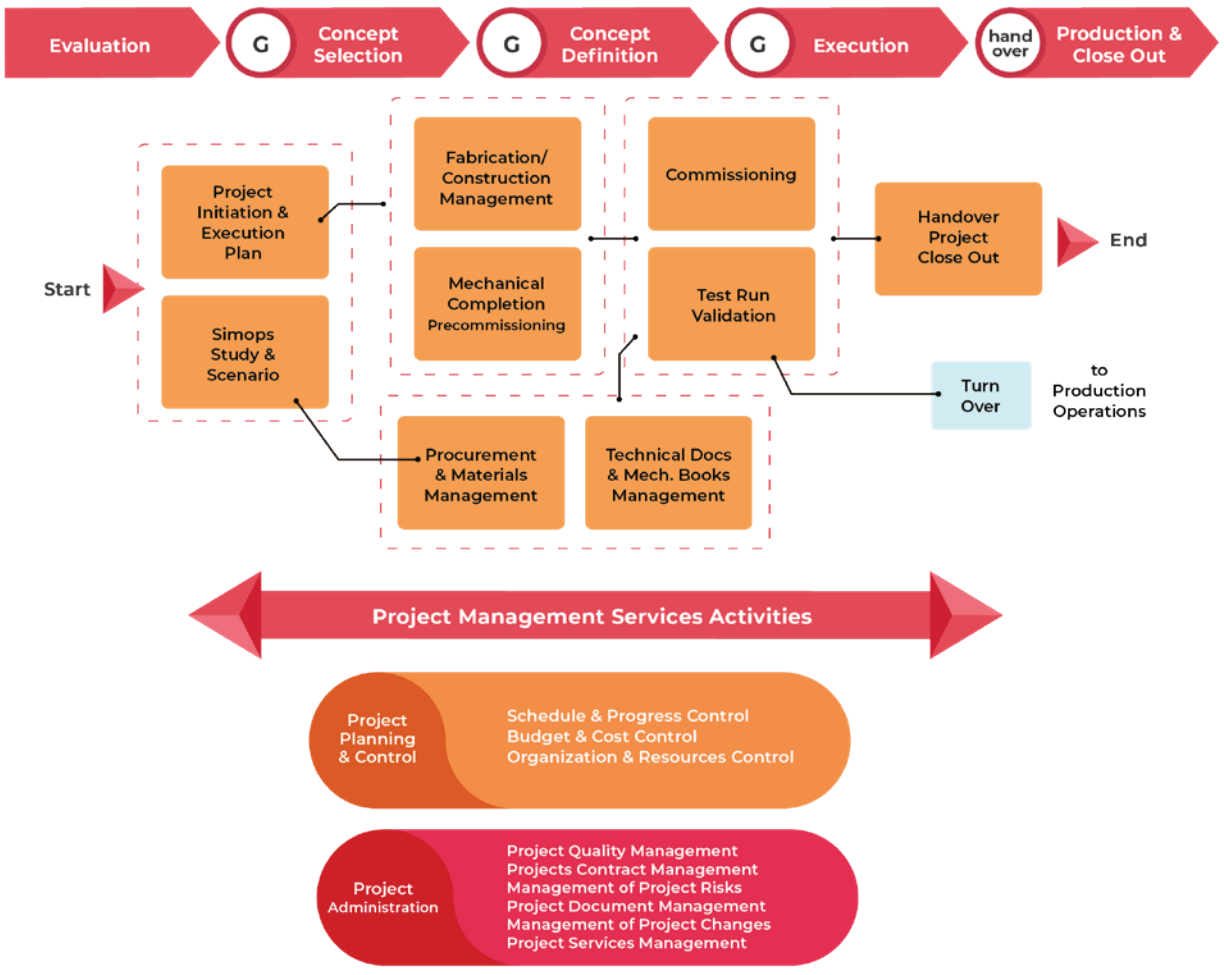


Figure 5.1. Development Project Life Cycle

Each phase accomplishes specific work toward reaching the project goal and produces a set of Each phase accomplishes specific work toward reaching the project goal and produces a set of deliverables. The first three phases focus on value identification, the last two on value realisation.
Deliverables are tangible, real items used to attain the final goal of the project, and include plans, schedules, drawings, etc. The end of a phase is sanctioned by a Gate at which a Decision Making Body decides if and how a project is to be continued.

5.1.7 SOCIAL, ECONOMIC AND ENVIRONMENTAL INFLUENCES

Projects have a very close relationship with the environment in which they are physically realised. External influences may have a significant impact on a Project and so the following aspects should be taken into consideration in all Project Management activities:

- Geographical location
- Laws and regulations
- Political, economical and social factors
- Cultural environment
- Logistics

5.2 PROJECT MANAGEMENT CYCLE

The Project Management Cycle is the heart of Project Management. It describes the steps necessary to fulfil the purpose of a project, starting from the definition of its scope and objectives, and ending with its completion or formal closure.
The Project Management Cycle is made up of four different main steps:

- Initiating: defining purpose, scope and objectives of a project.
- Planning: defining and selecting the course of action that will best satisfy project objectives.
- Controlling: ensuring that project objectives are being met by monitoring progress regularly and identifying deviations from plan that may require corrective action.
- Closing: formalising acceptance of the project and bringing it to an orderly end.

The four different steps are considered a cycle, because they are linked by the results they produce: the outcome of one step often becomes input to the next.
For planning-controlling steps, the cycle may be repeated. For example, the planning step produces a project plan, which is checked at the control step. If deviations are identified, the planning step is repeated in order to incorporate any updates.
The Project Development Process framework has been developed using the Project Management Cycle as a basis and as a consequence, there are strong similarities between them. The first three phases (from Evaluation to Concept Definition) correspond to the initiating and planning steps, while the last two phases (Execution and Production and Close Out) correspond to the controlling and closing steps.
That said, it is important to note that the different project management cycle steps are overlapping activities occurring at varying levels of intensity throughout each phase of a project.

The Project Management Cycle applies not only to the overall project but also to all project phases and, in principle, to every activity en a project. For this reason, It will be repeated - sometimes several times -for each phase of a project. The initiating step, for example is repeated at the start of each phase in the form of a phase set-up which helps keep the project focused on its objectives. In the same manner the closing process is repeated at the end of each phase, with the gate process assessing and eventually accepting (once it is satisfactory) the result of the phase.

5.2.1 INITIATING

Initiating consists of all the steps necessary to describe the purpose, scope and objectives of a project. The first step is to make sum that a clear and common understanding of project purpose exists. The Project purpose defines the needs that the project must fulfil and the major goals it must accomplish. Purposes do not simply exist by themselves; they are usually set by someone outside the project team, although sometimes the Development Project Manager. may be involved. This brings in the concept of Client and Executor. Projects are usually planned and executed by someone (the supplier/ the service provider) for someone else (the customer). Within ISS

International the practice is to adopt the Geographical Areas/Units as the Client and the Development Project Managers as the Executor.
Once the purpose is clearly understood, the next step is to translate the purpose into project objectives. Project objectives set the qualitative and quantitative measures (under the control of the project team) by, which performance and completion of the project will be judged. it is helpful to remember that project objectives are not really fixed and that trade-offs between an objective (such as cost) and another (such as schedule) are often required.
The last step is to define the scope of work, indicating the way in which the purpose will be satisfied and establishing the boundaries of the project. The definition of scope is an iterative process: full scope definition is often only reached when the Project is well-advanced.
Usually initiating can be formalised and discussed through a dedicated kick-off meeting.

5.2.2 PLANNING

Planning is aimed at selecting the course of action that will achieve the objectives the project was undertaken to address.
The first step is to further refine the scope by breaking it down into work packages. This may usually be achieved through the creation of a Work Breakdown Structure (WBS).
Once a structure for the WBS has been defined, the execution strategy can be developed. Aspects

which should be considered in developing an execution strategy include:

- Human resources. Number and type of people required to execute the project, how they should be staffed, the facilities they require, and how they will be demobilised at the end of the project
- Contracts. Selection of contracting strategy with a view to obtaining specific works, materials, services and expertise on the best commercial terms
- Procurement and Material Management. Choice of strategy for selecting vendors, tendering and awarding purchase orders, and for managing the transport, storage and handling of materials and equipment

The subsequent step is to estimate the resources required to undertake the activities in line with the proposed execution strategies, and to assess the planned time and cost for each one of the defined activities. Finally, a plan defining the preferred sequence for carrying out the activities (incorporating all known constraints between activities) is produced.

5.2.3 CONTROLLING

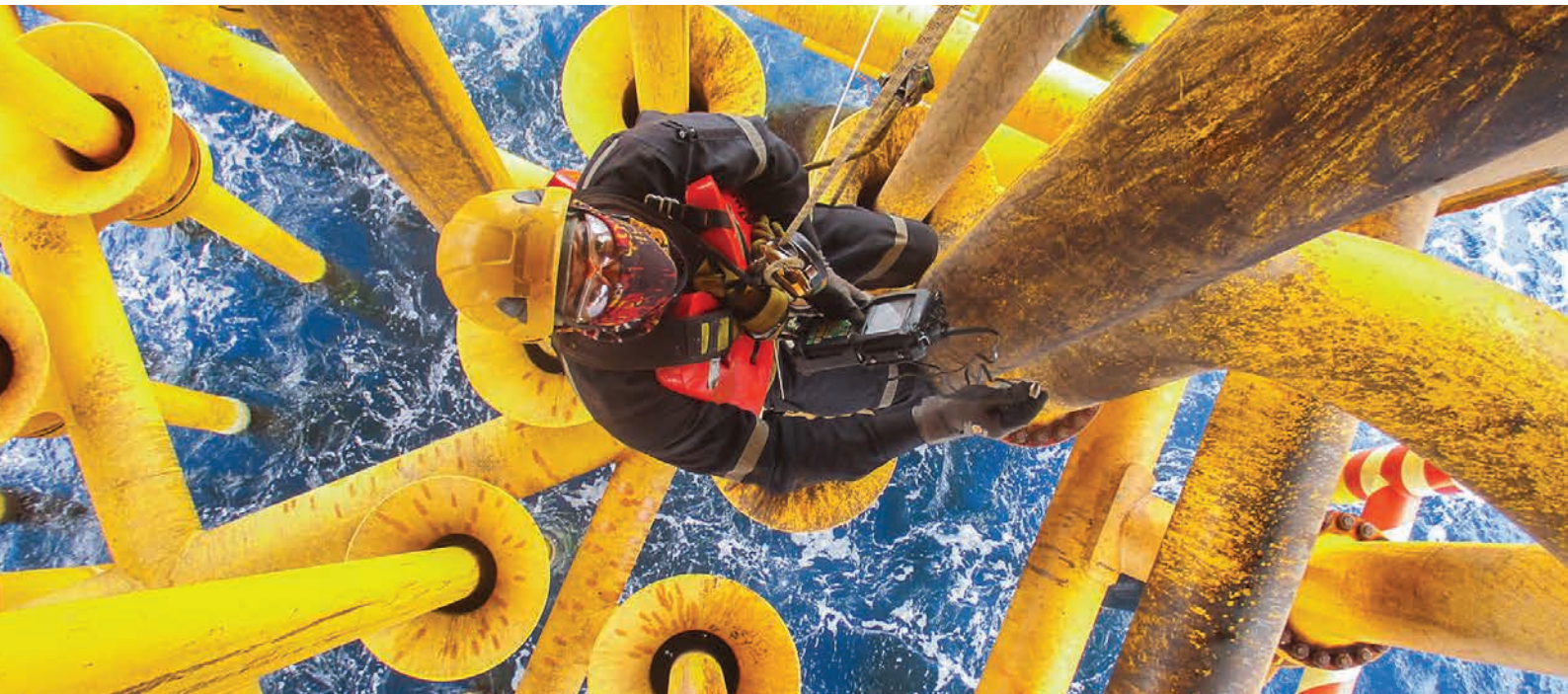
Regardless of the effort spent on project planning, there will always be unpredictable or uncontrollable events that can make a project deviate from its plan and it is therefore critical for project success to have a warning system that allows problems detection early enough to avoid major impacts. For this reason, an ongoing controlling process is required, in order to verity that the project is proceeding according to plan and to determine where and to what extent a deviation is occurring.

Controlling includes the following steps:

- Measuring performance
- Analysing performance
- Reporting performance
- Taking corrective actions if needed

Controlling is usually used to refer to the tracking of costs, time and usage of resources, but it also embraces other project aspects such as:

- **Project Changes**. Determining when and if a scope change has occurred and managing changes when they do occur.
- **HSE and Quality Management**. Monitoring specific project results to ensure. they comply with relevant HSE and quality standards, and identifying ways of eliminating causes of unsatisfactory results.



- **Team management**. Enhancing the ability of team members to contribute as individuals as well as enhancing the ability of the group to function as a team
- **Data and documentation**. Ensuring that the data and document .management system is working efficiently and effectively and that data and documents are properly controlled and handed over
- **Project administration**. Controlling that internal and external interfaces are properly managed

5.2.4 CLOSING

A project requires closure, after either achieving its objectives or being terminated for other reasons. The purpose is to resolve any open issues, complete any paperwork required for formal completion of the project, and gather information useful for evaluating project performance for future reference. Closure may involve many activities:

- **Acceptance of the project**: sign-off of an acceptance certificate together with the agreed plan for the resolution of outstanding punch list or follow-up items. Administrative closure: completion and settlement of contracts, including resolution of any open items such as possible claims, invoices not yet paid, etc.
- **Residual material management**: hand over, sale or disposal of surplus materials/left over material
- **Documentation of project results**: finer evaluation of project deviations in terms of time, cost and quality

Capturing lessons learned. It-is important to remember that a project can not be considered closed out until lessons learned have been gathered, analysed and shared within the organisation.

Project closure is usually documented in a report called the Close-out Report.

6 PROJECT MANAGEMENT AREAS

This section describes project management knowledge and practice in terms of their component processes. These processes are organised in Knowledge areas.
Project Management focuses on the following areas:

- **Project Framing** deals with the processes required to ensure that the Project structure is consistent with the Project objectives
- **Team Management** includes both Project staffing (Project Organisational Chart definition and selection of appropriate resources) and Team
- **Project Administration** includes Stakeholder Management, Interfaces between Project Team and other company functions, Permits and Consents, Office Administration and Action tracking.
- **Project Planning** and Control includes Planning and Scheduling, Cost Estimate, Cost Budgeting, Progress Monitoring and Cost Control processes
- Project Reporting describes the processes required to collect and analyse data, and to produce and deliver reports on the status of the Project.
- **Document and Data Management** includes processes related to planning, approving, administrating and controlling, and filing technical project documentation
- **HSE** and Quality Management includes the processes required to ensure that the project will satisfy HSE and quality needs.
- **Project Contracting** (or Procurement Management) describes the processes required to acquire goods and services from outside the Company. It consists of a procurement strategy, source selection and contract administration.
- **Material Management** deals with the processes required to ensure that the materials required are delivered to the right place at the right time and are maintained damage free and in a suitable condition of preservation.

In addition to these areas, this handbook also investigates two subjects which, although not typical Project Management themes, are of particular relevance for Development Projects, namely Insurance and Economics.

6.1 PROJECT FRAMING

Project Framing is the area of the PMS that structures the project processes in a manner consistent with project objectives from its initial stages and throughout its entire life-cycle.
The primary purpose of Project Framing is to create the correct level of project definition as the Development project progresses. Project Framing involves the following activities:

- **Project Scope and Objectives** definition, establishing scope and essential business goals
- **Project Development Planning**, defining the development strategy and how it is expressed basic elements that constitute the project (Reservoir, Drilling & Completion, Facilities)
- **Project Execution Planning**, providing both general guidance on how the project will be undertaken and requirements for mere detailed, activity-specific plans and work programmes

Project Framing can thus be said to enable “Front End Loading”, i.e. the practice of “choosing the right project” prior to committing to major expenditure with sanction, and “doing the project right” in the execution phase.
Project Framing includes Project Changes (or Change Management) activities in order to ensure that the project frame possesses sufficient flexibility to allow it to incorporate modifications caused by internal or external events.

6.1.1 PROJECT SCOPE & OBJECTIVES DEFINITION

The definition of Project Scope and Objectives establishes the primary rationale for the overall development program and thus prevents the project from focusing too much on optimising a technical solution and consequently losing sight of its business goals.
The definition of Project Scope and Objectives enables the Project Team to be aware of:

- The project scope in terms of features and boundaries, producing a dear picture of the development opportunity
- The results the project is committed to deliver in terms of all project perspectives (economical, technical, HSE, etc.)
- The key project drivers and constraints to be considered and managed for creating the optimum conditions to achieve project objectives

This information is formalized in the PSOS (Project Scope & Objective Statement), a high level document providing the comprehension of the project and representing the reference framework for future project decisions.’
The PSOS will typically make express reference to the directions contained within the Company Management System or Production Sharing Agreement (PSA) and Joint Operating Agreement (JOA).
The PSOS is a living document that is updated at the end of each one of the first phases of Project Development Process, is included within all DSP’s to make the Decision Maker aware of essential project features and strategies.

6.1.2 PROJECT DEVELOPMENT PLANNING

Project Development Planning contains a complete description of the approved development concept, highlighting its key features from a technical and economic perspective.
Project Development Planning is performed in parallel with the process of progressive project specification that starts with the results of the Concept Selection study and is finalized in the Concept Definition phase.
Project Development Planning covers the three basic technical areas of the project:

- Reservoir
- Drilling & Completion
- Facilities

It contains a description of each of these technical areas with emphasis on the following aspects:

- **Context** - including defining project features such as: ownership, reservoir history, geographic location, existing infrastructures, key project milestones
- **Technical characteristics of the project**, including the technical solutions developed with Reservoir evaluation and design studies such as: production data (e.g. field parameters, number of wells, design capacity), reference to design premises, production process
- **Development philosophies** - principles and requirements for field and facilities management and Operating philosophy
- **Costs** - backing up the cost estimate with details on key assumptions and CAPEX/OPEX breakdown

Carrying out Project Development Planning involves the following minimum requirements: a completed Reservoir evaluation, Basic engineering/FEED and an advanced/finalized tendering process. This significant level of project definition is capable of supporting -commitment to major expenditure and execution.

The deliverable of Project Development Planning is the PDP (Project Development Plan), produced at the end of Concept Selection phase and finalised at the end of Concept Definition phase. The POP is included in Project Sanction DSP, as established in the PDS framework.

6.1.3 PROJECT EXECUTION PLANNING

Project execution planning translates the established development strategy and policies" into a set of project plans and directions for achieving project business objectives.

The first step of Project Execution Planning is the definition of the elements that will govern project activities:

- **Project execution philosophy** - the definition of how the work is to be structured and packaged and the contracting strategy for each identified package. This area focuses on the major risks and

challenges (e.g. interface management, involvement of production staff) to the success of the proposed approach

- **Project Policies** - how the project is committed to major value enhancing processes like HSE, Risk management
- **Organization** - clear identification of roles and responsibilities assigned to the various bodies that constitute the organizational structure of the project

Once this framework has been established, a workflow may be defined, including:

- Identification of tasks, processes and work programmed far executing strategies.
- Definition of resource requirements for tasks
- Structuring of work team in terms of roles and responsibilities, and contributions from technical and functional competences
- Production of proposed master schedule focusing on key targets and milestones

The deliverable of Project Execution Planning is the PEP (Project Execution Plan), a core document that will be referenced by lower level plans that detail specific areas Of focus on the short term.
As established in the Management System, the PEP is included in Project Sanction DSP and represents, together with the POP, the key deliverable for gaining project' sanction from the Decision Maker.

6.1.4 PROJECT CHANGES

Changes (or project changes management) are authorized modifications to the project baseline and/or to project objectives (i.e. project economics).
Projects should be managed and executed according to the Project Baseline, that is the original approved plan (as defined under venous documents such as TOR, PSOS, PDP and.PEP) and includes:

- Scope;
- Time;
- Quality;
- Risks;
- Costs / economics.

Changes can be originated from variances, where a variance is the difference (A) between the planned value of a project variable and its actual value, as measured at the "time now".
Changes require approval from DPM's upper management level. Normal adjustments not impacting the project baseline are within DPM's authority (e.g. addition / deletion of a minor equipment related to normal engineering development, modification of wells coordinates, facilities modification due to company safety rules, etc.)
The Change Control emphasis is on keeping a tight control of variances and developing a proactive

management towards the same.
The purpose of Project change control (or change management) is to ensure that all variances are properly managed to ensure that project objectives are met.
When variances make project baseline:

- Unfeasible; or
- Modifiable (to augment the project value);

Proper corrective actions shall be identified and implemented and a new project baseline submitted for approval.
The above purpose is achieved by applying a process ascertaining that all variances am timely identified, analysed, and the corrective actions defined, agreed upon, informed to all interested stakeholders, executed and controlled, closed and evaluated, and the lessons learned gained.

Project Phases Vs. Changes

Depending on the phase of the project two principal changes may be identified;

- Term of References (T.O.R.) Changes (occurring in the early phases) .
- Project Changes (typically occurring after the Concept Definition Phase)

The first three PDP phases aim at “choosing the right Project”. Each of these phases is based on a Terms of Reference (T.O.R.) which states terms of references for the activities. Since a certain level of flexibility is required, potential changes in T.O.R. should be managed through an open process that allows improvement proposals to be dealt with.
On the other hand, Project Sanction dearly establishes the baseline of the Project. This implies that after Sanction, Project Changes require the application of a formal process. This process is described below.

Change Control Board

Project Change Control focuses on those variances ;requiring decisions by an appropriate upper. management level or body (herein referred to ,as Change Control Board – CCB)

Variance Origin

Variance may be categorized according to the following schemes:
Those originated by internal stakeholders project team, company function, etc.) and those originated by external stakeholders (authorities, partners, etc.).,
Those originated “from the project’ (i.e, gaps in project definition, opportunity of improvement in functionality, etc..) and those directed “to the project” (i.e. mandatory scope modification due to authorities and local regulations, business · requirements), This categorization is used regardless of the originator and focuses-on project goals rather than on the significance of the stakeholder.
Those that are not originated by, or attributable to any stakeholder (i.e. project assumptions regarding reservoir size, site conditions, inflation, change in prices, etc.): they am simply facts that require corrective actions or at least to inform CCU or higher management level.

Those variations not requiring the CCB approval (normal adjustments), will be managed directly by the DPM and the PT: the decision about the corrective actions or to reject the variation proposal is within their responsibility and authority limit. in any case DPM should involve all relevant stakeholders similarly as done by CCB in case of change.

6.2 TEAM MANAGEMENT

The purpose of team management is to produce an effective integrated work team, where the efforts of all project participants are directed towards the best achievable project result. A good team is composed of appropriately qualified individuals who are able to co-operate and interface with each other in a productive way in order to achieve the best result for the overall Project.
Team Management involves two major steps:

- Project staffing, aimed at the definition of the organizational structure of a project.
- Team motivation, which looks at the “soft” elements of individual behavior and team dynamics.

6.2.1 PROJECT STAFFING

Project staffing deals with the definition of the organizational structure of a development project, including project chart, roles and responsibilities, skills and competencies.
Its purpose is to establish an organizational structure that is consistent with project characteristics, will enable project objectives to be met and will allow the scope of work to. The organizational structure is set-up at the very beginning of a development project. Project staffing is in effect one of the first tasks to be performed in the Evaluation phase.
Effective organizational structures are not fixed entities. Instead they evolve during a project lifecycle, according to specific phase requirements (e.g. in the transition from the Concept Definition to the Execution phase construction capabilities need to be increased).
At the very beginning of the Project lifecycle, a core team is set up in order to begin defining Project goals and start planning. A clear definition of the Project Team may only be reached once these preliminary activities have been carried out.
To ensure that the proper organizational structure is in place as the project progresses through the different phases, a project staff upgrade is performed at least at the beginning of each phase.
Project staffing involves three major steps:

- Defining Project Charts (roles and responsibilities)
- Defining position requirements (skills and experiences)
- Selecting team members

6.2.1.1 DEFINING PROJECT CHART

Project charts identify the number and type of positions required and establish patterns/paths of interaction among team members.
The purpose of project charts is to ensure that:

- Each function / area of the project is properly covered by a position
- Main responsibilities are assigned according to a clear structure that defines hierarchical relationships and reporting lines

In addition, project charts:

- Specify the timing and the level of involvement of different positions (part-time, full-time)
- Identify positions outsourced to contractors
- Define how transition points within a project fife cycle are handled (e.g. how operations staff are involved in the Concept Definition and Execution phases)
- Project charts vary according to project characteristics. Factors that influence the project chart include:
- Project class: strategic, significant, routine
- Type of project: off-shore vs. on-shore
- Stage in the project lifecycle: pre-sanction vs post-sanction

6.2.1.2 Defining Position Requirements

When defining an organisational structure, consideration should be given not only to the number of staff required and their critical roles but also to their skills and experiences. Job description sheets are used to clearly define what is required for each position (in other words a description of the “ideal candidate). A job description usually contains;

- Job purpose:
- Key activities / responsibilities
- Qualifications (e.g. education, languages, ...)
- Experience (e.g. oil industry experience, specific experience in that position, ...)
- Competencies - hard skills (e.g. production operations expertise, commissioning expertise,...)
- Capabilities - soft skills (e.g. problem solving, team management, communications,...)

Qualifications and experience required usually vary according to project size and complexity, while competencies and capabilities are mainly determined by the position under consideration:

- When selecting for a managerial position, capabilities are usually the most important driver.
- Technical expertise is expected to be broad but not necessarily deep
- When selecting other project learn members, there is normally a shift in emphasis away from capabilities and towards technical expertise

6.2.1.3 SELECTING TEAM MEMBERS

Selecting learn members essentially involves matching skill requirements with available staff. Of course, it will not always be possible to find someone with the ideal profile for every position, and so it may sometimes be necessary to train staff up or to outsource a position.
When selecting team members, the time required for staffing and induction of resources should be borne in mind. The number and complexity of activities can sometimes grow so rapidly that it may become difficult for new recruits to quickly find their bearings. ft is therefore important when appointing key staff to fake into account pre-existing commitments and availability.

6.2.2 TEAM MOTIVATION

The success or failure of any project, no matter how large or how small, depends on the resources that make up the Project Team. Team motivation deals with individual and team.
The purpose of team motivation is both to enhance the ability of team members to contribute as individuals as well as to enhance the ability of the team to function as a team. An high-performing team can make a poorly planned project succeed, just as a poorly performing team can make a well-planned project fail.
Team motivation occurs throughout the project: however, it is of particular importance when the project is in transition from one phase to the next
It can't be taken for granted that a project team will achieve high performance as this depends on many different aspects, i.e.:

- Team alignment
- Team building
- Team motivation
- Performance review

6.2.2.1 TEAM ALIGNMENT

The objective of Team alignment Is to have each participant working toward a single goal, since this is one of the most powerful ways of ensuring Project success. Project scope and objectives need to be communicated to all team members to make sure that every one has a clear, shared understanding of project goals and key issues.
The alignment of team members is achieved through kick-off meetings held at the beginning of the project. Project scope and objectives are then reaffirmed following successful gates before the start of each phase. Specific alignment sessions need to be planned for all new members of the team.
Alignment should be reinforced through regular (i.e. weekly) meetings with the purpose of communication and information sharing. In these meetings Project Progress and specific issues can be discussed.

6.2.2.2 TEAM BUILIDING

The objective of team building is to improve interpersonal relationships among team members. Team building activities can vary from a five-minute break during regular work hours to an extended, off-site, professionally facilitated experience.
It is important that team building values and addresses the diversity of team members (e.g. of gender, prior work experience, age, culture, etc.)

6.2.2.3 TEAM EMPOWERING

A motivated team ensures best results for a Project. DPM or Team members may choose to focus on specific aspects of intra-team relations in order to increase their own personal motivation, e.g.:

- Understanding and addressing the personal needs of each person on Project Team: different people have different needs
- Recognising and appreciating good ideas
- Ensuring equality between Team members
- Creating Empowerment

6.2.2.4 PERFORMANCE REVIEWS

Performance reviews are carried out through feedback, i.e. the action of providing judgement on an individual / team performance.
Feedback may be both positive and negative. It should be remembered that, while giving positive feedback is easy, giving negative feedback is much more difficult and complicated. Care should always be taken in order to avoid hurting or offending somebody. When giving feedback, some simple rules can be followed:

- Give feedback as soon as possible after the event, do not wait
- Find clear examples of what needs to be changed
- Explain why performance does not meet the expected standard

- Balance criticism by examples of previous good performance
- Listen and check lithe person genuinely agrees

6.3 PROJECT ADMINISTRATION

Project administration provides a set of best practices for the management of the relationships of the (Development) Project Manager and Project Team with the Stakeholders. Project administration also provides indications for the management of specific processes such as Permits and Consents, Action Tracking and Office Administration.

6.3.1 STAKEHOLDER DEFINITION

The term 'Stakeholders" indicates individuals and organizations that are actively involved in the Project, or whose interest may be positively or negatively affected as a result of Project execution or Project completion. They may also exert influence over the Project or its results.
Two different categories of Stakeholders can be identified:

- External Stakeholders: all Stakeholders that are completely outside the authority of the Development Project Manager or of the Company. These include Partners, Authorities, International Agencies and other Regulatory Bodies, NGO's, the Media.
- Internal Stakeholders: all Stakeholders that are under either Development Project Manager or Company authority. These include Top Management, Geographical areas, Company Departments (both functional and technical) and Contractors.

Relationships with the first category of Stakeholder will be driven by a Stakeholder . Management Plan. For this reason, individuals and organisations belonging to this group will henceforth be known as Stakeholders.
The interface between the Project Team and the second group will be managed differently, as is described in the following paragraphs.

6.3.2 EXTERNAL STAKEHOLDER MANAGEMENT

Stakeholder management indicates how to relate with Stakeholders who are outside of DPM or Company authority. Such Stakeholders typically have requirements that, if not taken into account, may have a negative impact on the project budget and schedule.
Stakeholder Management is the process for dealing with. third party stakeholders and their requirements in a proper and timely manner in order to minimize impact on Project schedule, cost and quality.
The Stakeholder Management process operates throughout a project lifecycle. A Stakeholder Management Plan should initially be prepared as a deliverable of the Evaluation phase. The process should be formally revisited in each phase to provide a opportunity for the strategy to be reviewed and for the Stakeholder Management Plan to be updated (taking into consideration any new information or contribution).

Stakeholder Management should be regarded as an ongoing process. Progress and issues should be communicated across the management team, and the process should be. subject to regular formal review. Potential weaknesses or improvement points of the strategy should be promptly recognized, based also on stakeholder feedbacks, in order to incorporate appropriate change in the strategic pattern.

The Stakeholder management process involves key steps leading in the first instance to the development of a Stakeholder Management Plan (SMP) and then to the implementation and maintenance of that plan. -
The key steps in the Stakeholder Management process are:

- Identify Stakeholders
- Analyse Requirements
- Analyse interest and objective
- Define strategy and set action plan
- Implement and maintain the plan

An important part of the Stakeholder Management is the monitoring of the Stakeholder Satisfaction; a sort of measurement system to understand if the Project is performing correctly and it is aimed to met Stakeholder requirements and plan actions if deemed necessary. For this measurement system proper stakeholder satisfaction Models should
The key deliverable is the Stakeholder Management Plan (SMP), a document that states how Stakeholders and their requirements should be managed. The SMP includes the following information:

- List of identified stakeholders and their primary requirements
- Schedule, budget and quality implications of stakeholders' primary requirements
- Stakeholder analysis results containing:
  - interests, objectives and drivers
  - disposition towards Project and influence/power on Project outcomes
  - level of threat posed
  - possible strategies and actions
  - risk assessment (likelihood and impact on Project of potential actions)
- Proposed management strategy
- Action plan (key activities, timing and resource requirements)
- Monitoring plan for gathering and managing stakeholders feedback

It is important to recognize that stakeholders need-to be managed in a timely manner and within a single integrated process because:

- stakeholder requirements and potential stakeholder behaviour may have a serious impact on Project outcome (e.g. cost, schedule, HSE and quality aspects, etc.) if not taken into consideration from the outset .
- the awareness of what others are doing can create the opportunity of making Connections, taking advantage of synergies and making strategic alliances or partnership

- facilitate the management of perceived impacts – these may be as important as real impacts (e.g. sulphur dust) – which leads to more effective management of appropriate mitigation measures strategies
- for managing each stakeholder are not independent {e.g. often , stakeholders act jointly, or stakeholders may be impacted differently by the same decisions)
- the interfaces between each stakeholder and Agip KCO may occur not only directly within the Project organization, but also with other Agip KC() entities outside the Project

6.3.2.1 PARTNERS & STAKEHOLDER

The terms governing relations with Partners are usually described in the Joint Operating Agreement (JOA). A high-level description of the way in which business needs will be satisfied is also available in the Project Scope and Objective Statement (PSOS).
Interfaces with Partners are normally carried out by Top Management. Audits and reviews represent an exception to this rule, since they involve team members interfacing directly with the designated representatives of the Partners.
Subject to the conditions of the agreement, the Project Team may interface with Partners in:

- Sharing of development plans
- Committee activities (Fulfillment of PSA and/or JOA requirements)
- Planning and budgeting

Monthly reports issued by the Project Team keep the Partners informed of progress, critical issues and actions, and financial status

6.3.2.2 GOVERNMENT, LOCAL AUTHORITIES & REGULATORY BODIES

Each Project is subject to the taws and regulations of local Governments.
The DPM should understand that Government, Local Authorities and Regulatory Bodies may strongly influence the outcome of a project in cases where requirements for permits and consent have not been taken into due consideration and/or expectations have not been timely addressed.
Regulatory bodies include all district, regional, national and international agencies and trade Organizations involved in ensuring that a particular activity in project development (design, construction, shipment, etc.) is performed in compliance with national or international technical standards.
Certification Approval for Equipment and Materials is particularly important. The DPM should manage all necessary certification in accordance with an appropriate plan.

6.3.2.3 NON GOVERNMENTAL ORGANISATIONS (NGO'S)

There are a large number of NGO's in existence. and they come in many different types (example below). Several may have an interest in the Project:

- Environmental associations
- Trade unions
- Trade and industry associations
- Consortiums

Early identification of possible NGO interest is very important. This requires experience and knowledge of both national and local context.

6.3.2.4 MEDIA & OTHER STAKEHOLDER

Rotations with the media are managed by the Media Relations department. and are subject to a specific review and approval process defined under the JOA and the PSA.
Communications and public information planned should be commensurate with the type of project being realized (conferences, interviews, films, animations, etc, and should be approved under the Annual Work Program and Budget

6.3.3 INTERFACE MANAGEMENT

This paragraph covers two types of interface:

- Interface between the Project Team and the Stakeholders under the authority of the DPM,
- Interfaces within the Project Team,

The Project Team will establish and manage interfaces for each specific Stakeholder, Communication lines between the Project Team and other Company competencies should be clearly and formally defined.
Interfaces with Contractors are always regulated by contracts. This type of interface is therefore specifically described in the paragraph on Procurement Management.

6.3.3.1 TOP MANAGEMENT

Top Management takes the most important/strategic decisions on projects. In particular, it participates at Gates deciding whether a project shall proceed or not to the next phase.
Top Management defines business goals and drivers of the project in accordance to PSA and JOA requirements and monitors project performance against these. It also establishes major project targets which are generally outlined in the PSOS - such as the use of innovative technologies, fast tracking, etc.
The Interface with Top Management is a specific responsibility of the DPM, whose primary Interest shall be to keep Top Management constantly informed on Project status and progression. Both formal Project Reporting and informal communications support this interface.

6.3.3.2 CLIENT'S DIVISIONS / FUNCTIONAL DEPARTMENTS

The Project Team is part of Client's organization and as such has formal obligations it has to be compliant with (production of budget, reports, etc).
At the same time, the Organization should support the Project Team whenever necessary in performing specific activities. The degree of team completeness on terms of availability of specific functional and technical competencies within the Team) and autonomy depends to a large extent on the complexity of the specific project. Complex / strategic projects (as reflected In the project class) may have some functional competencies represented within the Team (e.g. resources from

the procurement department operating stably in the Team) whereas other, projects may refer to resources outside the Team for specific corporate services (e.g. where procurement operates in the functional area of the Company and is involved in the Team on demand). In the second case a careful administration of resources and the definition of methods for resource assignment is required,
Another critical interface with the rest of Client's organization occurs every time activities on the project are somehow dependant on other technical and functional activities managed outside the project itself (e.g. interface between drilling and development project).
The PEP, in addition to defining Project Organization, should describe how the Project Team will interface with Client's divisions. The DPM should also establish, promote and manage ground rules for these interfaces.

6.3.3.3 PROJECT TEAM INTERNAL INTERFACES

Each member of the Project Team has a specific role, but Project goals and objectives are common. Consequently, proper interface management between different disciplines is required (e.g. engineering and construction shall strictly co-operate and their activities should be carefully planned).
The person in charge of co-ordination the Project Team is the DPM. She/he should establish lines and methods of communication. It is particularly important for the exchange of technical data/ documents between project disciplines (structural, process, instrumentation, procurement, etc) that information is formalized, documented and periodically reviewed.
Part of the Project activities are usually performed by Contractors, Vendors or Professionals. As they are considered as part of the Team, the interface with them must be properly managed. The DPM should assign responsibilities (typically to a Purchaser Representative) for managing relationships with contractor organizations and thus for defining appropriate communication interface procedures Relations with vendors are generally limited to the purchase of products in accordance with procurement procedures.
Activities carried out by Professionals are often strictly related to specific work activities dune by the Project Team and may take place on a ':one-off' basis outlay last for the entire project lifecycle. Professionals are often consultants 'specialized in specific disciplines (e.g. legal, fiscal, safety, automation, etc,). Such activities are generally supervised by the DPM or by a technical expert within the project team.

6.3.3.4 INTERFACES AND PROJECT LIFECYCLE

Interfaces during Project transition between phases (e.g. from exploration to project development and from execution to production and close out) are of particular significance:
Generally speaking, when a gate or a key milestone is scheduled, an interface event should also be flagged up. Such events need to be properly' managed and, if necessary, monitored through Action Tracking.

6.3.3.5 INTERPERSONAL INTERFACES

While interfaces with Top Management, Company Divisions and within the Project Team may be described, planned and controlled through formal processes, interpersonal interfaces may be a sensitive issue to be managed.
Inadequate management of relationships between 'members of the project team and with the rest of the company generally results in a higher frequency of failures and accidents in the Project.
The term "Interpersonal interfaces' refer to the relationships that exist among project team members and with other project participants.
Interpersonal and organizational interface categories should be carefully considered by the DPM in order to avoid inefficiencies and delays in project activities.
A DPM should be aware of methods for managing interpersonal interfaces and of how they are a critical factor in project results. Details on theories concerning team motivation and development may be found in this manual under 'Team Management'.

6.3.4 PERMITS AND CONSENTS

Permits and consents necessary for the Project will be issued by the appointed authority/regulatory body according to national laws and regulations.
Obtaining permits and consents represents a 'constraint and risk for the project development: as a result of the request process, delays, additional requirements or refusal may jeopardize project objectives or even render them wholly unrealizable.
Authorities are one of the most important external Stakeholders, since they:

- Are responsible for ensuring the project complies with all applicable laws and regulations; and
- Receive pressure from other project stakeholders - such as the local population, local suppliers and contractors, environmental associations, etc. - and pass them on to the project.

Consequently, project planning and control must take into account authority requirements, estimating time it will take to obtain all permits and consents. All activities related to permits and consents (i.e. research into legal and other requirements, preparation and submission of documents, follow-up, etc.) shall be managed as a project activity and shall be included in the project schedule.
A strategy for obtaining permits and consents shall be prepared for each phase of the project. To simplify planning and control, permits and consents may be subdivided into the following categories:

- Concept Selection
- Concept Definition (i.e. Environmental Impact Assessment)
- Execution, subdivided in:
  - Wells:
    - ~ Drilling
    - ~ Operation
  - Facilities:
    - ~ Construction (i.e. building permit, etc.)
    - ~ Operation (i.e. production permit, health, safety and sanitary permits, etc.)

In order to facilitate the process of obtaining authorization, the following activities should be undertaken:

- Research into legal and other requirements
- Document preparation strategy
- Definition of Authorization Plan
- Monitoring of Requests for Permits and Consents

Research into legal and other requirements

- Identification of all laws and regulations applicable to the project, indicating those requiring the request of a permit or consent and those that do not. Production of a reference document containing this information for each phase of the project
- Identification of the authorities involved in the process
- Identification of other Stakeholders that might influence the authorities
- Definition of the mandatory requirements of the authorities and the restrictions imposed on project activities
- Definition of permit sequence
- Definition of timing for submission of documentation (consent request) and estimation of liming for granting of permit /consent
- Identification of other parties (i.e. consultants, other companies, suppliers, contractors, etc.) which may provide useful information and data to support this research
- Setting up of preliminary meetings with Authorities in order to:
  - Establish (for high complexity /risk projects) a general agreement regarding willingness of authorities to support the project
  - Agree the contents of the documentation to be submitted
  - Agree timing for the granting of consents (from time of submission), when timing is not defined or made clear within applicable laws and regulations
  - Learn about local customs and habits prior to project Execution

Document preparation strategy

- Assign and define responsibilities (i.e, to Project Team, Contractor, JV, etc.) far the ‘ preparation and submission of documentation.
- Adopt a common approach to the preparation and submission of documentation
- Check that all project areas requiring authorizations have been covered Produce a checklist, involving the authorities when necessary, to review the ·document before its official submission

Definition of Authorization Plan

To ensure consents are granted as quickly as possible, according to Project plans, and in order to enable smooth project execution, a plan shall be drawn up for the preparation of all documentation for submission.

The plan shall include:

- The output of the research info legal and other requirements
- The output from Project risk analysis
- The Permits and Consents management plan including:
    - Document preparation strategy
    - Document submission and follow-up
    - Project organization
    - Authorities management and interfaces

Particular attention should be paid to authorizations, which may delay or even halt subsequent activities.

Monitoring of Requests for Permits and Consents

In order to guarantee the smooth progress of the Authorization Plan, the Project Team shall appoint the person responsible for managing the interface with the authorities.

Typically for high complexity /risk projects - an appointed Consent Manager, reporting to top management and co-operating with the DPM, is responsible for managing the entire permits and consents process.

The person in charge of this function shall be involved from the beginning of the project. Although the Consent Manager may assign some simple tasks to other project functions, responsibility for the process lies entirely with him/her. When selecting staff to liaise with authorities on permit /consent matters, consideration should be given to the degree and type of technical expertise required.

The authorisation process status should be carefully monitored. Meetings with the authorities may be required in order to establish the corrective actions required - possibly including actions on other parts of the project (i.e. procurement strategy, design revisions, etc.). Additional documentation may become necessary to clarify critical aspects.

The project control staff shall prepare reports on the progress of the permit /consent situation. These reports should contain forecasts (i.e. progress and trends in obtaining consents) and analyses of

criticalities (i.e: planned works that will be prevented from going . ahead because permits /consents are unavailable)
Availability of Permits /Consents is one of the set of risks belonging to the category “country risk”.
The Permits and Consents process will provide the project Team with information that should be used by the risk management process to establish:

The impact on project schedules and costs of the time variances caused by unavailability of Permits /Consents:

- The contingency plan for unavailability of Permits /Consents;
- The risk monitoring and control plan during the Execution Phase in order to assess increase/ decrease of risk exposure

6.3.5 ACTION TRACKING

The main purpose of Action Tracking is to identify actions that require monitoring and then to monitor them. This is done in order to ensure that identified actions are correctly carried out and have produced the expected results.
Action tracking is based on 4 steps:

- Identification
- Action
- Monitoring
- Reporting

An action may be identified using any of the following methods:

- Brainstorming
- Critical path method analysis
- Decision making process
- Specific Process

Brainstorming is an activity that Project Team may use whenever minor issues have to be tackled. Resources from Projects are brought together in ad hoc meeting to discuss these issues with the

purpose of identifying specific solutions. This may lead to the identifications of actions that require tracking.
Decision Making is a more structured process utilized for issues involving a decision that is significant for the Project. During a decision making process, or as a consequence of a decision taken, specific actions requiring tracking may be identified.
Critical Path is a method used during planning and scheduling for identifying activities whose delay will cause knock-on delays to important Project milestones. Identification of these critical activities generally leads to the identification of specific actions that may be carried out either to prevent delays or to intervene when they occur.
Once an action has been identified it should be carried out by the action owner. To allow its status td be properly monitored, details of the action should be entered into the action register.
Periodical reports (usually monthly) will be produced by the project team to allow the DPM to monitor the status of actions, revise the original list (adding or removing actions), and keep track of the number of open actions and the percentage of closed actions

6.3.6 OFFICE ADMINISTRATION

The purpose of Office administration is to support the work of the Project Team. The Project Team is composed of different resources with different tasks, sometimes working in different locations and on different documents and activities.
Good office organization is fundamental to increasing Project Team efficiency. Office Administration facilitates daily activities (i.e, document searches, arranging meetings) so that the Team can concentrate on core activities. Office administration sets common ground rules for the Project Team, and includes indications on:

- Filing and storing both technical and general documentation
- In - out correspondence register
- Internal communication system
- Office organization

6.3.7 FILING AND STORING DOCUMENTS

The project office should have an adequate system for filing hard copies of documents. The system should contain the standard designations and classifications and an index of document names and locations.
The filing system should contain both technical and general documentation. Security levels for storage and access to project documents should be defined. Certain documents, produced during the initial PDS phases, will be used by third parties during later phases. A separate file shall be provided for these documents

6.3.7.1 IN – OUT CORRESPONDENCE REGISTER

A great deal of correspondence (e.g. letters, faxes, e-mails) is produced and received during the lifecycle of a Project. The Project Team should establish rules for coding inward and outward correspondence in order to facilitate traceability. A correspondence Register should also be set up in the form of an electronic file in a shared area of the computing system accessible to all Team members. For inbound correspondence, a distribution list shall be defined at the beginning of the Project and reviewed whenever necessary.
In general, inward documentation should be checked by the DPM and then distributed to interested functions.
Outward correspondence consisting of documents implying a formal Company commitment must be signed by the DPM. Working documents do' not usually need the signature of the DPM, but it is advisable to provide him/her with a copy of outward correspondence for information purposes

6.3.7.2 INTERNAL COMMUNICATION SYSTEM

The Project Team needs to be able to exchange information quickly and-continuously. A shared area of the computing system Mould be allocated for:

- Consulting and preparing documents
- Communicating meeting dates and times
- Plan personnel availability
- Etc.

6.3.7.3 OFFICE ORGANISATION

Office organization covers several aspects of the working environment:

- Project logistics: every team member should de provided with a computer (hardware and software) and a desk in reasonable time.
- Office safety and security
- Meeting and travel arrangements: booking of moms, planes, hotels
- Project Team Stationary: ensuring pens, printer toner, CDs etc are always available

6.4 PROJECT PLANNING & CONTROL

Project Planning & Control is the area of PMS related to the management of time, resources and costs in a manner that is consistent with project objectives throughout the entire lifecycle of a project. The primary purpose of Project Planning & Control is to develop and control project plans in order to ensure the execution of project scope within the schedule, cost and quality objectives
Planning & Control (P&C) activities are organized in a cycle of two main processes:
Project Planning, which includes:

- Planning & Scheduling
  - Cost Estimating
  - Cost Budgeting

- Project Control, which includes:
  - Schedule & Progress Monitoring
  - Cost Control

The Planning process is intended to define the baselines against which the project performance will be measured during the Control phase. This process is carried out by:

- Defining and formalizing the scope of work (What);
- Identifying the team that has to perform the scope of work (Who);
- Defining the logic sequence and the schedule for its execution (Flow and When);
- Determining the cost budget for carrying out all the activities scheduled (How Much).

The P&C cycle is not a "one-off process. The Project & Control cycle will be repeated throughout the various phases of the. Project life-cycle.

In addition to its organization into processes, the P&C cycle can be broken down into two groups of activities:

- **Plan & Schedule. Management**, which includes the activities related to:
  - Definition of project breakdown structures
  - Management of project schedules °.
  - Planning & Control of project resources
  - Physical Progress Management
- **Cost Management**, which includes the activities related to project costs management:
  - Cost Estimating
  - Cost Budgeting
  - Cost Control

6.4.1 PLANNING & SCHEDULING

The Planning and Scheduling process is aimed at the definition of the scope of work and breakdown structures (Planning) and the preparation of a schedule for project implementation (Scheduling). It involves the following processes:

- Planning
  - Scope of Work definition
  - Production of Work Breakdown Structure (WBS);
  - Production of Organisation Breakdown Structure (OBS);
- Scheduling
  - Definition of project schedule at various levels of detail;
  - Resource Planning;
  - Definition of S-curves for planned Physical Progress;
  - Consolidation of project schedule and definition of reference baselines.

6.4.1.1 SCOPE OF WORK DEFINITION

The definition and formalization of the Scope of Work is the basis for carrying out alt other Planning and Control activities and represents the process which transforms the project - premise into a clear, tangible and measurable objective.
It is an essential activity in order to ensure that all the work required to deliver the project. products, with the specified technical and quality requirements, is clearly identified.
This activity should be carried out in two steps:

- Analysis and definition of the project scope of work
- Formalization and documentation of the project scope of work

Through the analysis of the project requirements and objectives, the project team is required to clearly specify all the products that must be delivered and the work required for their delivery.
The formalization and documentation of the project scope of work is carried out via the definition of the WBS which represents the common framework for carrying out any other project management process. in order to assess the right importance of the VVBS definition over the entire Project Management Cycle, it could be stated that only the activities or the products identified with the WBS can be planned, estimated, budgeted and controlled. The work that is not identified on the WBS will be completely out of schedule, progress and cost control. For these reasons, the definition of the scope of work and its formalization into the WBS is to be intended as a major project milestone, which has to involve the most appropriate resources, both from management and technical skills, in order to get the best representation of the scope of work

6.4.1.2 PRODUCTION OF WORK BREAKDOWN STRUCTURE (WBS)

The WBS consists of a hierarchical tree structure containing the products and activities that need to be realised /carried out in order to fulfil the Scope of Work. Each descending level represents an increasingly detailed definition of the project work.
Since the definition of the WBS is based on a careful examination of project content (both in terms of products and activities), it can be said to represent the main activity of review and formal consolidation of the Scope of Work.
The WBS assists the project stakeholder in developing a clear vision of an end product of the project and of the overall process by which it will be created. It divides the project scope into hierarchical, manageable, definable packages of work, balancing the control needs of management with an appropriate and effective level of project data. The division of a WBS into levels facilitates focused communication with stakeholders and the clear identification of accountability /responsibility to the level of detail required for managing and controlling the project.
The process of WBS definition should be intended as a discussion and negotiation process, which involves the project team searching for the best structure for the management of the . specific

project. When structuring the WBS it is required a precise representation of the Scope of Work (In terms of contents); it is also essential to bear in mind the way in which the work will be carried out and the needs in terms of visibility over the Planning & Control data. Care should be taken to ensure that the WBS:

- Allows the dear and unequivocal allocation of responsibility for each work package
- Allows the aggregation of time, resources and cost data to a level of detail that will guarantee the Project Stakeholders the proper and adequate level of visibility Over the Project data
- Represents a valid basis for the definition of procurement and contracting strategies
- Allows the collection of data structured in such a way as to allow the setting up of a Company database containing historical information generated by the project. Such a database will greatly assist the planning of future projects, and the analysis of historical data for benchmarking and performance assessment activities.

The WBS definition is carried out through the completion of the following steps:

- Breakdown of the products to be delivered into their major components through the definition of the PBS (Product Breakdown Structure)
- Identification of the activities required for the realisation of the major components identified by the PBS via the production Of an ABS (Activities Breakdown Structure)
- Definition of the WBS matrix through the intersection between the-Products (identified via the PBS) and the activities (identified via the ABS). Each intersection of the matrix contains WBS elements that will require planning and controlling

A WBS may be produced from a standard template and the level of detail varies according to the specific demands of each individual project. The level of detail may be increased for one dimension only of the WBS matrix or for both product and activity dimensions together.

The WBS represents the basis for the definition of contractual strategies, for the formulation of contracts, and for their subsequent management. It does not, however, represent a limitation, in terms of level of detail, for the planning of a contract. Each WBS element can ‘ be further broken down by suppliers / contractors into activities / operations to the level of detail required for the proper management of the contract.

Generally speaking, a WBS should be designed to a level of detail that allows the proper. connection among the information managed by the various entities involved in the project, . but that does not impose any constraints or restrictions on planning activities.

6.4.1.3 USE OF COMPANY STANDARDS FOR WBS DEFINITION

Although the WBS may vary according to the specific project scope, the process for its definition should be carried out according to Company standards that define:

- The activities and product breakdown structures for each project category
- The coding system to be adopted for the identification of PBS, ABS and WBS elements
- The instructions for the definition of the various WBS levels
- The PBS and ABS dictionary

The use of Company standards facilitates the construction of the WBS and provides a common framework for the definition of its first levels.

The WBS defined according to Company standards allows the reporting of cost data on all projects undertaken by the contractors in a standard format at whatever level management desires.- Different levels of management can obtain reports at the Standard WBS level that best meets their cost information needs. On-line access to project costs is expected in a next release of the system.

The use of a standard WBS unifies the cost and schedule management functions and saves significant project management man-hours and duplication of effort. The standard WM also serves as a vital co-ordination fool when projects are executed by a number of the contractors divisions or at several locations world-wide. As it provides a complete definition of project scope, it is used to assign work to the various project participants, clearly establishes the boundaries of the work using terms included in the Standard WBS Dictionary. A standard breakdown structure allows the comparison between costs of different Projects, and so helps management to make informed decisions regarding the best locations for carrying out work when work packages are being awarded.

As the contractors standard WBS based database grows, cost estimating will become significantly easier. Man-hours, barge days, tonnage, and other estimating parameters, as well as cost data, are collected in accordance with the Standard WBS format for use in estimating future projects. This data may also be. used to check the reasonableness of current estimates by comparing them with past cost estimates.

6.4.1.4 ORGANISATION BREAKDOWN STRUCTURE DEFINITION

Once the scope of work has been defined and Me WBS produced, the organisational structure for carrying out the work identified in the ABS, needs to be established. This is done by the definition of the OBS (Organisation Breakdown Structure), based on the Project Organisation. The OBS, like the WBS, is a hierarchical tree structure, and is to be produced to fulfil the identification of both internal and external resources dedicated to the execution of the project.

Following the definition both of the scope of work (via the WBS) and the ‘structure for its execution (via the OBS), the duties and responsibilities matrix can be drawn up. This matrix is produced by

crossing the elements of the WBS with the resources as defined within the OBS, and it helps to establish clearly and unequivocally “who does what”. -
The OBS is a document that must be included in the PEP, It is particularly useful in the execution phase of the Project where the number of activities is extremely high, The Project Chart (described in the paragraph on Team Management) focuses on the Project Team (Team members, lines of reporting, staff personnel), white the OBS associates the Project Chart to the WBS to ensure that all the work packages identified in the WBS are clearly assigned. For this reason, the OBS includes external, resources (contractors, consultants, etc.) and on the other hand omits certain details of the Team Organisation which are not relevant for the work package assignment
Once this duties and responsibilities matrix has been drawn up, each single element of the WBS should be assigned to a single element of the OBS. Whenever an unequivocal assignment of responsibility is not possible, the WBS needs to be further detailed or revised. The unequivocal allocation of responsibility is fundamental for the correct planning and management of a project. For this reason, the definition of the duties and responsibilities matrix serves as a means of validating the structure and level of detail of the project WBS.

6.4.1.5 SCHEDULING

The aim of scheduling activities is to provide time objectives for completion that the Project (as defined in the W85) must meet. rt involves the issue of a series of schedules that identify, at varying detail levels: milestones, phases 1 macro-activities and activities necessary for project completion, execution sequences, execution dates.
The following schedules represent the output of Scheduling:

- Milestones Plan
- Project Master Schedule
- Project Detailed Schedule

Milestone Plan

The Milestone Plan is the most synthetic of all project schedules. It is drawn up by identifying project milestones (i.e. the most significant events in the development of a project) and the dates in which each milestone should be completed. Milestone Plans will be produced during the Evaluation Phase (and will be included in the PSOS), and will represent the Project baseline.

Project Master Schedule

The Project Master Schedule describes sequences and times for the execution of project phases and macro-activities. It is fundamental because it gives a global overview of development dates for the project as a whole at a level of detail, which gives proper visibility on the project schedule to the Top Management. The Project Master Schedule represents the starting point for the definition of detail plans for each single project phase and it may be updated retrospectively in order to reflect the results of each phase. The definition of a Project Master Schedule is carried out in a Gantt chart format, starting from the contents and objectives contained in the following documents:

- Milestones Plan
- Project WBS

Project Detailed Schedule

The Project Detailed Schedule breaks down the project phases and macro-activities planned within the Project Master Schedule into activities. Through the use of a "Rolling Wave' approach, the Project Detailed Schedule is developed for the various phases of the project in accordance with the time objectives defined for that phase in the Project Master Schedule.
The Project Detailed Schedule is produced using the PDM - Precedence Diagramming Method, which involves the following steps:

- Identification of activities
- Definition of logical sequence for execution of activities
- Activity Duration Estimate
- Definition of start and finish dates for activities
- Check for consistency with dates specified in Project Master Schedule.

The following represents the output of Detailed Project Schedule implementation activities:

- Logic network
- Activities barchart

Since Project Detailed Schedule activities are linked to WBS elements, schedules may be produced at varying levels of detail. This allows schedules to be tailored to meet specific visibility requirements.
The process for activity duration estimate and the relevant start and finish dates calculation is based on a deterministic approach which is applicable to project with a low level of uncertainty and a low level of schedule risk.
According to project size, level of uncertainty, activity duration estimate and the relevant start and finish dates calculation should be based on a probabilistic approach and 'a schedule risk analysis process is to be activated.
Schedule risk analysis process is aimed to determine the most probable project duration and scheduled dates according to a distribution probability profile.

Integration of Third Party schedules

The Project Detailed Schedule is the most detailed schedule produced by the Project Team. However, in order to make the schedules manageable /comprehensible, it should. not contain operative details

regarding study, design, construction and installation activities to be carried out by third parties
For third parties, the Detailed Project Schedule represents the starting point for the development of operational schedules that translate planned activities into deliverables (for example documents for engineering activities) or into elementary tasks (for example operations for construction activities).
Planning activities carried out by third parties should be performed in accordance with contractual instructions specifying tools and (operative) working methods to be used, in order to guarantee coherence and integration with the Project Detailed Schedule developed by the project team

Planning of Resources

This activity permits the definition of resource requirements (e.g. people, equipment, materials, technological) for carrying out project activities. This includes:

- Internal resources for Project Management, Procurement, Engineering, Reservoir, Drilling & Completion, etc.
- External resources for Engineering, Construction, Transportation & Installation, Commissioning & Start-Up and Drilling & Completion, etc.

The planning of internal resources allows the overall .Company workload to be considered when checking availability, and constitutes a basis for calculating related costs. The planning of external resources is normally performed directly by Contractors, However, a plan giving an indication of maximum quantities based on past experiences and performance standards should be drawn up internally by the project team for the following purposes:

- Checking workload profile and its compatibility with safety regulations, with mobilisation and demobilisation requirements, and with the availability of contractors capable of meeting resource requirements peaks
- Providing assistance in the selection of Contractors capable of satisfying required workloads
- Checking the coherence of sequences described in the Project Detailed Schedule.
- Defining appropriate basis for claim prevention.
- Resource Planning consists of the following steps:
- Identification of resource requirements (in terms of skills and quantities) for each single activity
- Allocation of resources to detailed activities
- Definition of resource requirement profiles
- Integrated time resource optimisation to achieve both feasibility in terms of resource availability, and efficient, streamlined deployment of resources
- Revision and consolidation of Detailed Project Schedule

Definition of Physical Progress S-Curve

In order to properly manage a project, it is essential to carry out an exact evaluation of project status through the calculation of the physical progress actually achieved at a certain date compared with planned S-curve. Physical progress is the amount of the work actually performed and is calculated using the Following techniques:

- **50/50.** With this technique, fifty percent of physical progress is earned when the activity starts, and the balance is earned when the activity is completed
- **0-100.** This approach applies to very short activities and assumes that 100 percent of progress is earned when the activity is completed
- Milestones. With this technique intermediate milestones are defined for each activity. Each milestone is evaluated in terms of its importance. The 100 percent of activity progress is split between the milestones, according to their importance. The sum total of the percentages for milestones that have been achieved at a given date represents the physical progress of the activity.
- Actual **Quantity**. With this technique physical progress is calculated on the basis of the quantity of work actually performed against the total quantity of work to be performed.

For the implementation of a system for measuring physical progress following criteria need to be defined:

- Weighting criteria, for calculating the 'Weight" of each activity as a percentage of the total project;
- Progress measurement criteria to be applied to each activity for assessing progress
- Criteria for weighting and progress measurement am strictly related to the type of activity to which they are applied.

6.4.2 SCHEDULE & PROGRESS MONITORING

During Project Execution the Project Team must activate ail actions necessary to ensure that the plans are followed and that any variance is promptly identified and managed, in order to avoid negative impacts on project completion objectives. This must be done on a regular basis (i.e. a proper control frequency).
This is carried out by implementing a Scheduling & Progress Monitoring process based on the following steps:

- Gathering progress data for activities carried, out internally or by third parties;
- Updating of schedules and physical progress monitoring;
- Monitoring resources.

Each one of the above steps involves the following activities:

- Gathering actual data
- Processing actual data
- Analysis of processed actual data and comparison with project baseline
- Collecting and validating third party actual data

Progress data collected at each cut-off date for activities carried out by Third Parties must be integrated into the Project Detailed Schedule. Progress data supplied by third parties (execution dates, quantities, physical progress) must be validated by the project team.

6.4.2.1 PROJECT SCHEDULES UPDATE

The updating of project schedules involves:

- Recording of actual start and finish dates of activities;
- Estimating of forecast finish dates;
- Comparison between initial planning, actual" status and
- Identification and analysis of potential variances and evaluation of impact on project objectives
- Identification and simulation of corrective actions to absorb effect of identified variances

While the Planning & Scheduling process is carried out using atop-down" approach, developing high level schedules that are then exploded Into detailed schedules, the Scheduling & Progress Monitoring process is based on a "bottom-up" approach. Actual data is collected at detailed schedule level and then aggregated within high level

The control starts with Detailed Project Schedule activities and therefore extends to the macro activities defined in the Master Project Schedule and to the milestones of the Milestone Plan

6.4.2.2 MONITORING OF PHYSICAL PROGRESS OF PROJECT

During the control phase, the physical progress achieved for each activity in the Detail Plan should be calculated. The criteria used for the calculation of physical progress should be consistent with those used in order to determine values for planned progress and for drawing the corresponding S-curves. The Monitoring of physical progress consists of the following steps:

- Calculation of actual physical progress for each activity;
- Updating of S-curve using actual physical progress data and calculation of forecast figures;
- Comparison between planned progress, actual progress and forecast progress to complete: ▪ Identification and analysis of variances and evaluation of impact on project objectives;
- Evaluation and simulation of corrective actions to absorb effects of identified variances.

6.4.2.3 RESOURCE MONITORING

Resource Monitoring is aimed at:

- Quantifying resource expenditure for execution of project activities;
- Quantifying resource requirements for project activities to be completed;.
- Updating resource estimates on the basis of previous resource expenditure and resource requirements for project activities to be completed

Resource monitoring is applicable to all types of resource and all project activities. Actual & Forecast resource figures should be analysed on an integrated base with the physical progress figures in order to calculate the Resource Performance Index – RPI. The RPI will support analysis of the adequacy of resources made available for the project (both in . qualitative and quantitative terms). The RPI is calculated as follows:

RPI = Earned Resources 1 Actual Resources

where, Earned Resources = Physical Progress % Resources Budget

6.4.3 COST ESTIMATE

Cost estimating involves developing an approximation of the Costs of the resources (people, equipment, materials) needed to complete the project activities.
Once a WBS has been defined, cost estimation can take place. Having established the extent of the activities as outlined in the WBS, the next step is to estimate costs to undertake the activities in line with the proposed concept.

6.4.3.1 POSSIBILITY TO INFLUENCE COSTS & COST EXPENDITURE

The first three PDP phases focus on value identification. In these phases, the focus should be on Cost Estimating, since the potential for influencing Project Costs is higher. In these early phases, changes to Project set-up can be made with a considerably smaller effort in terms of time and costs than in later phases. The following processes are very important in these phases:

- **The Value Engineering process** - consisting of an analysis of the functions of a project, process, or system in order to satisfy those functions and essential characteristics in the most profitable manner, thus maximising cost effectiveness (in terms of satisfying stakeholders needs and expectations);
- **The Risk Management process** - the systematic process of identifying, analysing and responding to project risk. It includes maximising the probability and consequences of positive events (opportunities) and minimising the probability and consequences of events adverse to project objectives (threats).

Once the Concept Definition phase has been completed, Execution starts and major expenditures occur. At the same time, the potential for influencing project costs decreases dramatically, and changes to Project set-up require rework, changes to the work sequence, etc. that produce a ripple effect on other activities. As a net result, total cost expenditure increases significantly.
The PDP should bear in mind that decisions taken early on have a stronger influence on project results, and that the Cost Estimate can represent a fundamental source of support in making the right decision. The Cost Estimate is one of the most significant element included in the Decision Support Package, since it provides a cost quantification of the project, and thus a basis for evaluating project alternatives

6.4.3.2 COST ESTIMATE AREAS

A capital investment estimate can be subdivided in three areas of costs:

- Capital Expenditure (CAPEX), occurring mainly during Execution phase;
- Operating Expenditure (OPEX), occurring & during Production phase;
- Decommissioning and Abandonment Expenditure (DEGAB), occurring at the end of the Production phase.

Capital expenditure (CAPEX) are all costs attributable to the creation of a permanent or. fixed asset. A CAPEX estimate may be produced, for products or Physical Components . (wells, onshore facilities, offshore facilities, sub-sea, terminals, pipelines, etc.) or Activities (engineering, procurement, construction, drilling, completion, transportation, installation, . commissioning, insurance, etc.). Up until the Concept Deflation Phase, a CAPEX estimate will be associated to each scenario.

Operating expenditure (OPEX) are all expenditures incurred in the operation and maintenance of an asset. OPEX include all costs relevant to the operation of the field (personnel, maintenance, major overhauls, chemical and consumables, electric power and other utilities, work-over and well operations, insurance, indirect costs, royalties, tariffs, etc.) ‘

Decommissioning and abandonment expenditure (DECAB) are all costs incurred at the end of Production Life in dismantling facilities, abandoning wells, decontaminating the area, and restoring the site in accordance with local law/regulations and consents. During the early phases of the

project (Concept selection and definition) estimates of cost of. decommissioning and abandonment are based on past experience. During the Production phase a detailed decommissioning plan is produced including a detailed cost estimate.
Another parameter used in evaluating project alternatives is Life Cycle Cost (LCC), defined as the sum of CAPEX, OPEX and DECAB

6.4.3.3 ESTIMATING METHODS

The methods of estimating available / applicable depend on a number of factors, such as: the phase of the project, the requested level of expected accuracy, the skill of the estimator, the risk assessment and the availability of project data.
In this handbook particular attention will be paid to CAPEX estimating, since it refers to the cost of a Development Project, which is managed directly by the DPM during project Execution. OPEX and DECAB refer to the Production and Abandonment Phases. During the Development Project they are taken into consideration only for the purposes of economic evaluation and when selecting the best concept.
Project Changes (i.e. modifications to the approved project baseline) made during project Development and after project sanction may affect the OPEX and DECAB cost estimate: therefore, in evaluating such changes the trade-off between costs and benefits should always be. considered, by evaluating the revised project's economic parameters. The following are the different CAPEX methods that can be chosen during project development phases:

- **Capacity Factored**: the cost of a new project can be calculated from the known cost for a similar project of a different size or capacity using the cost-capacity (corrective) factor;
- **Total Installed Cost (T.I.C.) curves**: the cost of the project - or of its main physical components - is calculated using curves developed by the regression of data for similar projects or their main components: these usually include the indirect costs as well;
- **Equipment Factored**: the cost of a new project can be calculated by summing the cost of the various physical components, each factored to include ancillary components and the various project activities;
- **Parametric models**: consist of mathematical expressions - based on statistical analysis- that incorporate one or more technical, programmatic, functional, or other parameters related to the physical component or project activity being estimated;
- **Detailed unit cost (with forced detailed take off / with detailed take off**): based on semi- final I final engineering documentation multiplying quantities for the relevant unit cost

The detailed unit cost estimate requires the definition of all resources (people,. equipment, materials) needed to complete the project activities.
Resource requirements are defined following definition of the project scope and in parallel with the definition of activities. For each physical component (and related activities) the project team should specify the people, equipment and materials (bath temporary 'and permanent) required for execution /completion (ire, for fabrication/construction, the manpower for the various disciplines, the fabrication/construction equipment, temporary construction facilities, the utilities, and various ancillary services). This process is repeated for all physical components and related activities.
The resources are grouped according to type and. the total quantity' for each type is calculated. The total quantity is then multiplied by unit cost. Once the resources have been defined, activity durations need to be adjusted to reflect the resources selected. Sometimes there is some degree of freedom in selecting resources and the basic selection criterion is to maximise value (he Value Engineering process may be useful).
The unit cost (or total cost in case of high technology equipment) is based 'on purchase orders from past projects, new offers or purchase orders, long terms agreements with suppliers, cost database, equipment / material cost curves, etc.

Cost estimates shall be corrected to account for specific project constraints, Which often are not included in unit costs, such as geographical location, environmental conditions, logistical issues, local productivity factors, taxes and duties, etc.
Cost estimates are generally expressed in. units of currency (Euro or Dollars) put in some cases the estimator may use units of measure like man-hours, staff 'days, etc. Overall cost, on the other hand, should always be expressed in units of currency (estimates based on' different unit of measures are to be converted).

6.4.3.4 DETERMINISTIC AND PROBABILISTIC COST ESTIMATING

Two basic approaches to estimating cost are possible when using the detailed unit cost method:

- The deterministic cost estimate, based on fixed cost figures for each cost item (for routine projects);
- The probabilistic cost estimate, based on probability distribution for each cost item (for significant and strategic projects).

"Routine", "significant" and "strategic" are employed here with the meanings of importance that is Project Classes.
The terms 'base cost' used in the paragraph below represents cost, within both deterministic and probabilistic estimates, excluding any unforeseen unpredictable circumstances, or uncertainties within the defined Project Scope (which are separately calculated and covered by the contingencies explained in the relevant paragraph).

Deterministic Cost Estimating

Deterministic cost estimating relies upon fixed cost figures or "base cost' for each cast item: this cost is based on the estimators experience (correspondence to the P(50/50) probabilistic estimate may be assumed). Contingencies am calculated as a percentage of the base cost and are added to cost item(s).

Probabilistic Cost Estimating (or Cost Risk Analysis)

Probabilistic cost estimating, or Cost Risk Analysis, relies upon a probability distribution for each cost item. Each "base cost' item is modelled as a triangular, beta, gaussian, etc. probability distribution function of the cost, in order to account for the uncertainty inherent in the cost estimate for each item. The definition of the probability distribution function for each cost is reached by interviewing team members, Stakeholders (typically expert personnel in the Company), consultants and by querying the cost database.
In- order to sum the effect of the various probability distribution functions for all cost items (and thus to obtain a total estimate) the project team should use software such as the Monte Carlo simulation that produces a cumulative probability distribution curve of target cost achievement
The cumulated probability curve provides information about:

- Min. cost Max. cost range;
- Central value of the estimate: P(50/50) and other characteristic values such as P(10/90), P(90/10);
- The cumulative probability of not exceeding each target cost;
- Comparison of various project scenarios.

6.4.3.5 CONTINGENCY

Contingency covers costs that may result from incomplete design, or unforeseen/unforeseeable circumstances, or uncertainties within the defined Project Scope. The range of the contingency will depend on the status of design, procurement and construction, and the complexity and uncertainties of the component parts of the Project Contingency is not to be used to avoid making an assessment of expected costs.
Contingency does not take account of project changes: these shall be approved, funded and managed using the Change Control process (Change Management).
For deterministic cost estimates:

- Overall percentage: contingencies are calculated as a percentage of the estimated project cost;
- Detailed percentage: contingencies are calculated as the sum of the contingencies estimated for each physical component or project function;
- Detailed percentage considering probability of occurrence: contingencies are calculated as the sum of the contingencies estimated for each physical component or project function weighted for probability of occurrence.

For probabilistic cost estimates:

- Detailed supported by risk analysis: contingencies are calculated by carrying out a risk analysis for each cost item involving an evaluation of cost impact and probability of occurrence distribution.

The detailed contingency estimate supported by risk 'analysis is based on the cumulative cost vs. target cost curve described in the previous paragraph. Often this curve is represented in its reverse form for two reasons: first of all it is better for expressing the not to exceed cost" concept and secondly because all available software uses this feature
When contingencies are under evaluation, the minimum and maximum costs are easily calculated, so curves are usually expressed in the form shown in the figure below.

6.4.3.6 ACCURACY

Expected Accuracy Range (EAR) is an indication of the degree to which the final cost outcome for a given project will vary from the estimated cost.
As the level of Project definition' increases, the cost estimate methodology selected may benefit from the increased availability of detailed data and information, and thus the expected accuracy of the estimate tends to improve. The improvement in accuracy is the combined effect of:

- More detailed and accurate data and information;
- The application of a cost estimating methodology more suited to the detailed data and information available.

Project cost estimates should be carried out using cost estimating methods that will provide the required level of accuracy.

The EAR of an estimate is traditionally expressed as a range of +1- X% around the estimate assuming sufficient confidence that the actual cost outcome will fall within this range.

The figure below shows the upper and lower boi6daries of EAR, defined as having a probability of Less than 10% of overrun and under run respectively (10% refers to P(10/90). and P(90/10))

This means that a cost estimate output for Concept Definition of 1000 (units of currency), with an EAR of +20% 1 - 15%, has a 10% probability of exceeding 1200 [(1000 x (1 + 20%)j, and a

“10% probability of being lower than 850 ((1000 x (1 – 15%)].

It is recognised that in the absence of reliable probabilistic cost estimates, the purpose of defining confidence level indicators or accuracy ranges is somewhat limited. It does, however,

provide a basis for a consistent use of estimating terminology and definitions and thus for the future validation of current practice with regard to accuracy and contingency.

6.4.3.7 COST ESTIMATE AND COST BUDGETING

The Cost Estimate represents the input for Cost Budgeting, which is the process of allocating overall cost estimates to individual activities or work packages in order to:

- Define cost vs. time expenditure to support the economic analysis;
- Establish a cost baseline for measuring project performance.
- Often a re-aggregation of the cost estimate in accordance with the company cost breakdown structure is required, since the project cost control system must match the company accounting system.

6.4.4 COST BUDGETING

Cost Budgeting involves allocating overall cost estimates to individual cost elements in order to establish a cost baseline for measuring project performance.

The cost budgeting process is based on output from:

- Cost estimate;
- WBS;
- Project schedule,and involves the following activities:
- Definition of the cost Breakdown structure
- Definition of the original budget
- Cost Phasing.

6.4.4.1 Cost Breakdown Structure (CBS)

In order to ensure that alt project costs are properly identified, budgeted for and monitored and in order to ensure proper visibility of project costs status, all cost management activities should be organised in accordance with the Cost Breakdown Structure (CBS). The CBS is a hierarchical structure, which allows the representation of budget figures at varying levels of detail. It thus guarantees an optimal flow of economic information relating to the project. The initial step in producing a CBS is to further break down overall project cost elements to the level of detail required. It may be constructed using a standard company template, which will facilitate the integration of information between the Cost Management System and Company Accounting Systems (of the Client).

Integration between CBS and WBS

Within the accounting systems, cost data is reported. using cost codes that may or may not be directly related to the WBS. This series of cost codes is commonly known as the chart of accounts corresponding to the Cost Breakdown Structure and Cost Elements. It is very important to relate this Cost Breakdown Structure to the project's Work Breakdown Structure. The ratio is normally n cost element to .1 WBS element.

6.4.4.2 Original Budget

The Original Budget is the cost objective a project must be completed within. It is the cost baseline produced before
Project Sanction and included in the Project Execution Plan.
It is defined through a process of analysis and adjustment of the estimates Made during the Cost Estimate process.
The definition of the Original Budget uses the CBS structure as an initial base. Each CBS element is constituted by 1 or more Cost Elements (CE). GE's constitute the basis for the evaluation and monitoring of project costs. For Cost Phasing purposes, these Cost Elements are allocated to Detailed Project Schedule activities at a ratio of 1:1 or 1:n.
Updates from procurement office that take into account changes in the market occurring between the calculation of estimates and executive project planning;
Preliminary investigations of potential suppliers

6.4.4.3 COST PHASING

In order to ensure effective management of project costs it is essential to check their progress against physical progress of the project and schedule status. For this reason, the Original Budget should be time-phased in accordance with project execution dates. The result of this process is the cost baseline, which is a time-phased budget that will be used as a reference for measuring and monitoring cost performance. It is produced by calculating, the sum of estimated costs by period and is usually displayed in the form of an S-curve, as illustrated in the figure below.
The Cost Baseline will allow the project team to take a measurement of the cost situation on a regular basis (monthly, quarterly, yearly).
The Cost Baseline is also the basis for carrying out Earned Value analyses:

- Intermediate points of the S-curve represents the BCWS (Budget Cost of Work Scheduled), i.e. the cost at BV (Budget Value) of all works scheduled to be accomplished at the cut-off date
- The final point of the S-curve corresponds to the BAC (Budget At Completion), that represents the project budget

6.4.5 END OF THE PLANNING PHASE

The planning phase ends when resources, costs and execution dates for activities have been planned within the project completion objectives fixed by the Client At the end of the planning phase, all planning information is consolidated in the Project Baselines which represent the framework for project monitoring and performance measurement

6.4.6 COST CONTROL

During project execution, and with an appropriate frequency, the project team should initiate all actions necessary in order to ensure that the costs defined in the budget are respected and that any deviations are quickly identified and dealt with.
Cost Control consists of the following steps:

- Gathering actual costs data;
- Updating Cost Elements with actual costs data;
- Estimating cost to complete; ·
- Updating estimated final cost;
- Identifying and analysing deviations from budget contained in cost estimates;
- Evaluating and simulating corrective actions to absorb effects of deviations;
- Updating project Cost Plan.

6.4.6.1 Gathering actual costs data

The following values should be measured for each Cost Element and at each cut-off date:

- **Committed**, Including the value of all financial undertakings made, via the issue of material purchase orders or contracts. The value should include orders issued within open contracts (job orders for services or delivery orders for materials);

- **ACWP (Actual Cost of Work Performed) or AC (Actual Cost)**, including costs already accounted for before the cut-off date plus a value calculated by the Project. Team on the basis of resources used, progress made with goods (services to be supplied, and on contracts. This value is used to carry out Earned Value analyses
- **Invoiced**, the total sum of invoices received' for approval by the Project Team from Suppliers / Contractors;
- **Accounted**, costs already accounted for;
- **BCWS** (Budget Cost of Work Scheduled), is the cost, at BV (Budget Value) of all works scheduled to be accomplished at the Cut-Off date
- **EV (Earned Value) or BCWP (Budget Cost of Work Performed)**, is-the cost at BV (Budget Value) of at work actually accomplished at the Cut-Off date

6.4.6.2 ESTIMATING COSTS TO COMPLETE

Actual Cost data (Committed, Actual, Invoiced and Accounted) accrued for each Cost Element are compared with the corresponding budget figures in order to carry out the Estimate to Complete. The Estimate to Complete is the test possible estimate at the cut-off date of further expenditure necessary for the completion of the project.
The Estimate to Complete should be based on the following parameters:

- Costs incurred to date and cost performance to date;
- Situation with regard to engineering activities and estimate of resource requirements to complete;
- Tenders / offers for materials and services to, be issued;
- Market information on prices of materials and services to be purchased;
- Identification of claims for design activities from third parties;
- Potential addendum deriving from engineering variations / modifications;
- Identification of potential claims from Suppliers for on site activities, deriving from a change to quantities or from a change in unit price;
- Potential increases in direct and indirect site costs, deriving from extensions of construction / start-up phases

6.4.6.3 Updating Estimated Final Cost

The Estimated Final Cost (EEC) constitutes a trend-based modification of the Original Budget calculated using Actual Costs (AG) to date, and the Cost Estimate to Complete (ETC). EFC is a forecast of most likely project costs based on past project performance and is normally determined as follows:
EEC = Actual Costs to date plus a new estimate for, all remaining work. This approach is most often used when past performance shows that the original estimating assumptions were fundamentally flawed, or that they are no longer. relevant due to a change in conditions
Formula: EFC = AC + ETC
EEC = Actual to date plus remaining budget (BAC – EV). This approach is most often used ' when

current variances are seen as atypical and project management team expectations are that similar variances will not occur in the future.
Formula: EFC = AC + BAC – EV

EFC Actual to date plus the remaining project budget (BAC – EV) modified by a performance factor, often the Cumulative Cost Performance index (CPI). This approach is most often used when current variances are seen as typical of future variances.
Formula: EFC = (AC (BAC – EV)/CPI) – this CPI is the cumulative CPI

Each of these approaches may be the correct approach for any given project and will provide the Project management team with an indication as to whether the EAC forecast is beyond acceptable /tolerable levels. By comparing the EFC and the Original Budget, it is possible to calculate potential or actual variances and, if necessary, initiate a process of analysis, evaluation of impact on project budget and corrective actions that may be taken to absorb the effects.

In order to be able to determine the .project cost trend, it is essential to carry out a comparison between current EEC and that of previous periods. This comparison makes it possible to establish whether the gap between the Original Budget and the EEC is increasing or shrinking, and also to evaluate the effectiveness of corrective actions undertaken to reduce deviations identified at previous cut-off dates.

6.4.6.4 Revised Budget

The Original Budget represents the cost objective within which the project must be completed. It may only be modified in the case of changes authorised by the relevant budget approval bodies. The revision of the Original Budget leads to the calculation of a · Revised Budget, which becomes the new cast objective within which the project must be completed.

Such revisions may only take place following:

- **The transfer of budget items** – i.e. the reallocation of funds to different CBS elements caused by a change in technical or management circumstances of a project;
- **The approval of Variation / Changes** due to a 'change in the scope, of work.

In the case of Variations, the Revised Budget should be. calculated by adding

6.4.7 VARIANCE MANAGEMENT

Once that schedules, resources, and cost monitoring activities have been carried out, the actual Figures obtained should be compared with the corresponding planned figures. and the variance between the two analysed.
The identification process consists of a screening aimed at highlighting only-those variances which are of significant entity and which must be analysed and dealt with in order to ensure that pre-established project objectives can continue to be met

6.4.7.1 Variance Analysis

The analysis of variances is aimed at:

- Identifying the causes of variances;
- Evaluating their impact on project objectives;
- Identifying possible corrective actions.

Variances may be caused by the following:

- A change in planning base parameters;
- Incorrect evaluations during the planning phase;
- Unforeseen circumstances (defective materials, accidents etc.);
- Supply problems with Materials or Services;
- Market problems;
- Inefficient working methods;
- Changes occurring during execution of works

The main aspect an analysis of variances needs to consider is the general impact of variances on the project as a whole. Particular attention should be paid to:

- Delays to project;
- Variances in total cost.

Once these analyses have been carried out, one or more corrective actions should be identified. Corrective actions should be evaluated in terms of their capacity for resolving partially or totally the problem

6.4.7.2 Absorption of Variances

Once possible corrective actions have been identified, a check should be carried out to see if they absorb the variances. There are two possible scenarios:

- Total absorption;
- Partial absorption.

If total absorption results from the check, the process finishes with the implementation of the appropriate corrective actions and the updating of forecasts to incorporate the effects of the actions implemented. The absorption process can be initiated via the use of appropriate project contingency plans.

In the case of partial absorption (or no absorption), the Project Team should produce a document for Top Management highlighting the causes of the shifts and the impact of changes to project objectives following the failure of corrective actions to absorb the shifts. Wherever the relevant budget approval bodies believes it necessary, it may authorise a revision of plans (re- planning).

6.5 PROJECT REPORTING

Reporting is the formal means of recording the status of the Project at each cut-off date. it shall include:

- Physical progress
- Performance
- Quality of work
- Actual versus planned status
- Problems and proposed solutions
- Economical status

The correct management of a Project needs to be supported by a good reporting structure in order to keep all Stakeholders informed about the status of the Project. The clear organisation of planning

and control data is fundamental for ensuring that all necessary . information is both precise and quickly available

The objectives of Reporting are to:

- Clearly identify the current status of Project
- Compare actual achievements with target plans
- Highlight critical areas and propose solutions or actions for problems identified

Reporting is therefore useful because it arrows Stakeholders to get a clear picture of Project status, but it also provides the Project.Team with a means of exercising pressure on Stakeholders, e.g.:

- Soliciting decisions on particular issues
- Requesting reviews of controversial Project decisions
- Influencing events outside direct control of the Project

6.5.1 REPORTING DURING PROJECT LIFECYCLE

Reporting is an activity that should be performed throughout the entire Project lifecycle, However, the depth and completeness of Reports produced normally increases as the Project Progresses, Therefore, at the beginning of each Development Phase, it is suggested that the Project Team establish typical contents, frequency, and distribution /lists for reports.

6.5.2 TYPOLOGY OF REPORTS

It is possible to identify three different types of Reports, each of which have different objectives and audiences:

- Monthly Progress Report
- Weekly Report
- Daily Report

The Monthly Report represents the minimum requirement for reporting during the Project We cycle. It covers all Project disciplines and is aimed at, giving an overview of all Project activities. This kind of report is produced for at types of Project regardless of class and. importance. Sometimes DPM might take the decision to produce two versions of the same monthly report, with one containing only information relevant to external Stakeholders.

Both Weekly and Daily Reports can be produced whenever the DPM considers them necessary.

Contents of reporting should be carefully managed. Generally speaking, excessively limited information generates misunderstandings, suspicion, or requests for further details (which requires further work and therefore impacts an Project activities). On the other hand, too much detail could make the report unmanageable (and therefore not read by Stakeholders).

It is thus suggested that the Project Team make use of graphs instead of lengthy descriptions, in order to make the report more readable.

6.6 DOCUMENT AND DATA MANAGEMENT

Data and Document Management is the, area of the PMS that ensures the availability of all necessary information to Project Team members during the project life-cycle and to the operations team after hand-over. Data and document management also helps maximise the retention of Company know-how and the capitalisation on lessons teamed.

In this document the term document refers to “an Original or official paper relied upon as the basis, proof, or support of anything else”. A document is an official and structured piece of information produced as a result of project activities or to support project activities.

The term data refers to a collection of structured information that can be. supplied to; stored in or processed by an IT application. Data is always associated to the time at which it was created.

Standardisation and structural organisation is particularly important for data: while documents are generally “self-standing” (containing both information and an explanation of the information), data is information that should be considered in its context. Standardisation allows for a better comparison of project data.

The purpose of Document and Data Management is to:

- Identify, codify and manage data and documents to be produced, verified, maintained, revised, controlled, distributed, and filed both during and after the Project;
- Ensure that the interfaces between the Company/Contractor’s data. and document management systems around the world are correctly managed in order to reduce information hand-over costs, and to avoid loss of information or misunderstandings`
- Ensure data longevity and re-use of Information for entire asset life lip to abandonment;
- Support technical standardisation of all activities (e.g, engineering, drilling, reservoir);
- Ensure consistency and availability of information in Change Management (Contract changes, Project changes, etc.)

6.6.1 DOCUMENT MANAGEMENT STRATEGY

The Document Management Strategy should be established early in the Evaluation Phase, and updated and implemented from the Concept Selection phase onwards.

Document Strategy should cover the following aspects:

Electronic Document Management System

An Electronic Document Management System able to electronically capture, code, store, retrieve and manage electronic documents generated by or received from internal or external sources during the Asset and able to interface with other Company or external applications should be set up.

Access and security strategy

The Document Strategy should define rules and levels of access to documents (read 1 create / modify) for Asset Team members. ·

Document features

The Document Management Strategy should define how document features should be managed during the Project. The main document features are:

- Ownership (prepared by, checked by, approved by)
- Code and Title
- Status (i.e. drafts, issued, approved, superseded, etc.)
- Scope and applicability
- Revision
- Dossier (i.e. all document package to which the specific revision is part of)
- Validity (i.e. Entire Project Lifecycle, Specific Project Phase, Production Phase, etc.)
- Accessibility (i.e. company confidential, internal, public etc.)
- Distribution list (when document is released and when Project ends

Standardisation and Coding

A standard template for documents should be defined and distributed to Project Team members. At the same time standards for document coding p6rposes should also be identified

Filing

Rules for archiving documents should be defined. It is suggested that the Project Team archive documents both electronically and physically
Finally, Document strategy should define back-up rules for electronic files.

Document Retention Strategy

The Document retention strategy should be established in compliance with Company. Policy and should define the life cycle of documents, according to the following distinction:
documents that are not necessary during the Operation phase, but must be kept stored for a set number of years for legal or other Company reasons (contracts, etc)
documents to be used during operation and maintenance. (e.g. Operation manuals, as built . drawings, etc.)

6.6.2 DOCUMENT PLAN

The Document Plan should clearly define all the documents that must be released in each of the Project Development phases and their respective Schedules.

Document Planning

Al the beginning of each of the Project Development phases the fist of documents to be released should be drawn up. For each of them, the Document Plan should identify the owner and all' their relevant features (validity, scope and applicability...) as defined in Document Management - Strategy.

Document Programming (schedule)

As established in the Project Plan, issue dates (for intermediate and final releases) should be defined

for each document, In preparing the Document Plan, it is particularly important to identify critical documents (documents whose release is on a critical path .of Project schedules - e:g. procurement activities, which cannot start if technical specifications have not been issued).

Document Production, Check and Issue

The issue of every document shall require a quality (i.e. code, format, etc.) and technical check in order to comply with Company standard requirements,
Document Progress control, revision and status management At every document issue the following actions shall be performed:

- Document progress control in order to verify physical progress and compliance with schedule. This activity should produce specific document reports, which will support the DPM in performing overall Project progress.
- Check on document revision sequence and status
- Association of revisions to specific milestone and dossier (e.g.: issue for tender, issue for permit request, issue for approval)

Document Distribution

Document distribution shall be carded out in accordance with the Project Document Distribution Matrix. This table shall establish the addressees of the different types of document and their respective competencies.

Document Archiving

Rules for archiving documents shall be applied as defined in the Document Management Strategy

6.6.3 DATA MANAGEMENT STRATEGY

The following kinds of data are typically handled during the course of a Development Project:
Reservoir data (pressure, size, depth, etc.)

- Engineering data (plant design capacity, weight, length, etc.)
- Procurement data (type of contracts, contract values, etc.)

Key data features to be managed:

- Criticality for project purpose
- Computation mode (if applicable) Expected precision (if applicable) Revision status
- Originator and time of creation

An effective and resource-efficient data management strategy should be established at the very beginning of the Evaluation Phase and updated at the beginning of each subsequent phase.
The timing of the strategy is crucial. Decisions about specific tools to be applied, integration and interface with other Company/Partner/Contractors management, procurement and engineering tools and systems (e.g. Project Management System, Material Management System, etc.), user access, as well as the structure and the format of data, should be made before the data has begun to be produced, otherwise a lot of rework restructuring and regenerating data will become necessary.
The following activities are part of the data management strategy definition

- Data management policy definition
- Data management system definition
- Data management procedures definition

Those elements should be then checked and adjusted at the beginning of each phase

6.6.4 DATA MANAGEMENT POLICY

It is important to recognise that each data Row may have a different level of criticality with respect to the achievement of project objectives and should be treated accordingly. There follows .a suggested data criticality classification and data management policy.

Critical Work-In-Progress Data: all technical and economical data with a very high impact on the overall project performance or on its evaluation. Examples are expected production estimates, project CAPEX and OPEX values, project duration etc. This type of data should be treated very carefully. If a more updated version of critical work-in-progress data is released, team members should be notified (as necessary) by the data owner and the work in progress documentation updated accordingly.

Uncritical Work-In-Progress Data: all technical and economic data that is not critical to the project but cannot be considered “frozen” (“live data”) and therefore should be managed during the activity workflow.

Consolidated Data: all data that can be considered definitive and therefore freely used by project team members (subject to relevant access restrictions). This means that the user does not need to worry about updated releases. Input data references (source, revision date) ‘,should always be included in project deliverables. Furthermore, adequate data notation for each set of data should always be. used, in accordance with good engineering practice (e.g. number of significant figures, measurement units, expected data accuracy and precision).

6.6.5 DATA MANAGEMENT SYSTEM DEFINITION

A clear understanding of data flows is the basis for the successful definition of project data management systems. The definition of a “Project Data Model” at the very beginning of the project is therefore strongly advisable. This diagram depicts the flow of information within Me integrated team itself and between the integrated team, Company functions supporting project activities and contractors.
The “Project Data Model” is one, of the key elements in a Data Management System. The other elements are:

- Dedicated database (i.e. technical, economical, project management) for storing project information

- Company ERP system
- Company reference databases (technical standards)
- Network support

Two issues should be addressed carefully in this phase:

- The compliance of databases with activity work-flow (data models can be used to define database specifications)
- Standardisation of Data management formats and -. when it is not possible to achieve standardisation - the definition of exchange formats (especially considering the fact that contractors/ other company areas might be using different software applications).

6.6.6 DEFINITION OF DATA MANAGEMENT PROCEDURES

Data management procedures covering specific aspects of project data management are generally required on Projects. These procedures should contain reference to specific toots and data management systems (including instructions), if any.

6.7 HSE & QUALITY MANAGEMENT

The PMC does not provide extensive reference to activities and deliverables that fall within HSE and Quality management. This is due to the fact that HSE/SD and Quality each have their own Corporate Management System which provide requirements and actions to be carried out on these matters.
The PMC recognises that projects shall be in full accordance with HSE goals and principles as defined in the HSE Corporate Management System and in line with Quality requirements stated in the Quality Corporate Management System.
HSE and Quality Management is the area of the PMC that aims at ensuring that HSE and Quality requirements (respect of laws, health, safety and environmental protection) are adequately defined and met so that Project objectives may be satisfied without delays or extra- costs.
Project HSE and Quality management means achieving project goals by “doing things right the first time”. There is a strong relationship between HSE and Quality, and the time and cost of a project: one of these three elements may be optimised at the expense of the other two. The project manager is responsible, in co-operation with key project personnel, for finding the answer to the question: how can I comply with HSE and Quality requirements and complete the project on time and within the budget?
The purpose of HSE and Quality Management is to ensure that HSE and Quality requirements are adequately addressed during the project life-cycle, i.e.:

- identifying adequate HSE and Quality requirements for each phase of the Project
- executing project activities in accordance with applicable laws and regulations
- issuing the specified deliverables according to schedule
- obtaining the necessary permits and authorisations
- obtaining Stakeholders’ satisfaction

The correct application of HSE and Quality Management within a Project allows project objectives to be achieved in a safe and satisfactory manner.
That means:

- that design deliverables are issued with the expected quality in the right time
- that the activities of qualified contractors are properly supervised
- the right working procedures (protecting people, the asset, and the environment) are followed in accordance with Project plans, schedules and within the budget
- a fit for purpose facility is constructed, installed and operated as planned

6.8 PROCUREMENT MANAGEMENT

Procurement Management is the area of the PMC aimed at ensuring that services, works, products, goods and materials of the appropriate quality are made available at the correct time and place during the lifecycle of the Project.

Procurement is a process consisting of the following principal sub-processes:

1. Contracting
2. Purchasing
3. Materials Management

It should be noted that all sub-processes must comply with specific legal requirements, The above sub-processes all have the following basic steps in common:

- Identification of needs (list of contracts, list of equipment, list of materials, specifications, etc.)
- Qualification (of professionals, contractors, vendors, products, materials)
- Tendering,
- Evaluation (of tenders, choice of on-the-shelf products)
- Issue of contracts (contract awards, issue of orders)
- Follow-up (contract management, product / material control)
- Feed-back (lesson learned)

The purpose of procurement :management is to:

- Identify all works, services, products, goods and materials (in the following all called items) necessary for the Project;
- Ensure the availability of these items, in the right place at the right time
- Transfer the appropriate information to interested organisations (project team, operation personnel, ,stakeholders)

Correct procurement management reduces the risk of items necessary for project activities (e.g. design, construction, installation, operations and maintenance) becoming unavailable.

Procurement Management is based on the following main deliverables:

- Contracting Strategy
- Purchasing Strategy
- Material Management Strategy
- Location Analysis
- Gap analysis (on existing procedures/criteria/vendor list)
- Market Analysis
- Procedures and evaluation criteria
- Vendor list
- Procurement plans
- Tender documents
- Contract award recommendations
- Contracts
- Purchase orders
- Documentation for expediting spares materials and service contracts

6.8.1 CONTRACTING

Contracting implies:

- The choice of a contracting strategy and of the processes and schedules necessary for successful award of major contracts
- The definition of contracting activities
- The issue of the contracts plan

6.8.1.1 THE CHOICE OF CONTRACTING STRATEGY

The provision of services, equipment and materials represents the major part of the cost of a project, and therefore the choice of correct strategies (contract, purchasing, material) is one of the most important decisions to be taken within a project.

The contract strategy should include and provide clarification of:

- Number and types of major contracts (what is to be contracted)
- Contracting schemes (i.e. EPC, Alliance, etc.)
- Payment schemes (reimbursable, fixed price or lump sum, etc.)
- Duration of contracts (short-term, long-term or partnership)
- Commercial aspects (market analysis, who should bid and why, the cost impact of the commercial strategy)
- Risk analysis of contracting alternatives

The contracting strategies prepared for a specific project must be carefully reviewed and agreed with management to ensure they do not conflict with other company interests.

The contracting strategy is defined as the combined plan For all the major contracts within a project with respect to the decision on commercial form, method of contractor selection and combination and interfacing of activities. The development of the contract strategy should be tackled at the earliest possible time and should be based on a thorough analysis of available options. The Development Project Manager should develop the contract strategy in close co- operation with the Procurement department, which has the responsibility for approving the contract plan, and with any Stakeholder who may have an input in the final decision.

Determining the preferred contracting strategy involves aspects such as:

- Contractor availability and compatibility
- Host government position and influence
- Market forces;

and is based on the following guiding principles:

- Maximising value
- Optimising cost and schedule
- Efficiency
- Alignment with project definition and project execution
- Matching responsibilities to competencies
- Balancing financial I commercial risk with ability to manage and absorb it
- Minimising contractual interfaces
- Aligning goals
- No compromising on HSE

6.8.1.2 The definition of contracting activities

These activities, developed in conformance with corporate procedures, involve:

- Defining all main contracts (identification of needs};
- Pre-qualification and qualification of contracts;
- Tendering for the contract (invitation to tender invitation to bid);
- Evaluation of offers and award of contract;
- Contract control and follow-up;
- Feed-back;
- Close-out

6.8.1.3 The issue of Contract plan

The contracts plan, as part of the PEP, should be one of the aspects by which the "Decision Making Body' judge the soundness of the proposed project plan before commitments are made. Developing the contracts plan is a basic element of planning. The plan must reflect both WBS and project organisation, defining all key personnel responsible for one or more contracts.
A sound contracts plan should achieve a balance between a minimum number of contracts (in order to reduce the number of interfaces to be managed) and the contractor's ability to perform all the activities.

6.8.1.4 The execution of contracting activities

Contracting activities must be carried out in accordance with all applicable laws, regulations and corporate procedures. They should be executed in the manner described below:

Defining all main contracts

This is a result of the development of the contract strategy and involves assigning the responsibility for one or more contracts to specific project learn personnel. It also involves the preparation of alt necessary contract documents. Attention must be paid to the following aspects in preparing contract documents:

- Use of standard documents;
- Reference to design documents, specifications and drawings;
- Reference to procedures;
- Statement of contractor's responsibilities; Statement of insurance requirements;
- Statement of HSE requirements;
- Legal review of contract documents.

Pre-qualification and qualification of contractors:

- Pre-qualify firms for bidding;
- Establish acceptance criteria;
- Evaluate contractor qualifications.

Tendering for the contract

- The issue of Invitation To Tender (ITT) packages (definitive plans and specs);
- The Invitation To Tender (ITT);
- The response to bidders queries;
- Holding of clarification meetings

Evaluation of the offers and contract award

- Organisation of evaluating team;
- Formal acceptance of the bidder's document;
- Evaluation of bid documents following applicable procedures;
- Definition of the bidders short-list;
- Negotiating phase;

- Issue of recommendations for contract award;
- Selection of the successful bidder;
- Contract award.

Contract control and follow-up

- Availability of all necessary plans, procedures, and schedules;
- Clear and formalised Subdivision of responsibilities;
- Monitoring of contractor activities (compliance with laws and regulations, evaluating quality, safety, lime, cost);
- Reporting on progress of contractor activities; ‘
- Stopping works when necessary;
- Maintaining change order files;
- Recording sources of materials;
- Witness / carry cut test and inspection of critical items;
- Accepting (or not) deliverables;
- Approving (or not) payments;
- Resolving disputes.

Feed-back

- Preparation of the feed-back report covering the main aspects of the contract (evaluation of contractor’s performance, evaluation of effectiveness of the procurement process);
- Issue of the feed-back report and distribution to interested functions;
- Analysis of the report in order to initiate appropriate actions (i.e. qualification or not) by authorised functions.

Close Out

- Collecting together of relevant contractual documents (specifications, as built, drawings, inspection/test certificates, etc.);
- Verification of these documents against *tract;
- Preparation of the close out certificate transferring responsibility for contractual output to final receiver;
- Close-out of commercial issues.
- Feed-back and close out provide important information for lessons learned processes

6.8.2 PURCHASING

Purchasing involves:

- Definition of a purchasing strategy and of the processes and schedules necessary for the successful performance of purchasing activities;
- Definition of purchasing activities;
- Issue of the purchasing plan

6.8.2.1 PURCHASING STRATEGY DEFINITION

The purchasing strategy should be developed jointly by the Project Team and the Procurement function. As the purchasing strategy is defined, the processes and schedules related to purchasing activities are documented in the purchasing plan (which is part of the PEP.

6.8.2.2 Definition of purchasing activities

Purchasing activities must be carried out in conformance with corporate procedures. They involve:

- Defining all main purchases;
- Pre-qualification and qualification of vendors;
- Bidding;
- Procurement / request for bids;
- Evaluation of offers and issue of orders;
- Order control and follow-up;
- Material management during construction activities; Feed-back;
- Close-out

6.8.2.3 Issue of the purchasing plan

The purchasing plan, as part of the PEP, should reflect corporate procurement policies and host government requirements as well as identifying what will be provided in-house and what will be purchased by third-parties.

A schedule should be developed to identify key milestones for critical material deliveries based on vendor data. Purchasing procedures, preferably corporate standards, should be established. The purchasing plan should also make provisions for training of operations staff and the possibility of “health-care” contracts, where the maintenance of the equipment for a specified period is included in the vendor’s scope

6.8.2.4 Executing purchasing activities

All purchasing activities have to be executed in accordance with all applicable laws, regulations and corporate procedures.

Defining all main purchases

This is a result of the development of the purchasing strategy and involves assigning the responsibility for one or more purchases to specific project team personnel. It also involves the preparation of all necessary purchasing documents. The following aspects should be considered in preparation of purchasing documents:

- Completeness of list of items to be purchased;
- Vendors responsibilities;
- Review of purchasing documents (data sheets, specifications drawings, inspection. & test requirement sheets, etc.)

Pre-qualification and qualification of vendors

- Pre-qualify firms for bidding;
- Establish acceptance criteria;
- Evaluate vendors qualifications.

Bidding for the purchase

- Invitation to bid;
- Holding of necessary clarification meetings.

Evaluation of the offers and issue of orders

- Organisation of evaluating team;
- Review of the vendor's document;
- Evaluation of bid documents following applicable procedures;
- Negotiating phase;
- Issue of purchase recommendations;
- Selection of the successful vendor;
- Issue of order.

Purchase control and follow-up

- Monitoring of vendor activity;
- Expediting;
- Witness / carry out tests and inspection of critical items;
- Inspecting items at receipt;
- Accepting (or not) deliverables;
- Approving (or not) payments;
- Settling disputes

Feed-back

- Preparation of the feed-back report covering the main aspects of the purchase (evaluation of vendor performance, evaluation of the effectiveness of the procurement process);
- Issue of the feed-back report and distribution to interested functions;
- Analysis of the report in order to initiate appropriate actions (i.e. qualification or not) by the authorised functions.

Close out

- Collecting together of documents related to the order (specifications, drawings, inspection/test certificates, etc.);
- Verification of these documents against the order;
- Preparation of the close out certificate transferring responsibility for the purchase to final receiver.

6.8.3 MATERIAL MANAGEMENT

Procurement is heavily involved in Material Management activities: in fact part of the Material Management process is carried out by Procurement. In this handbook, however, it has been considered important to describe the whole material management process, from engineering to maintenance. For this mason a separate paragraph has been dedicated to this subject.

6.8.4 SPECIFIC REFERENCE DOCUMENTATION

The following Company documents, guidelines, procedures, standards support the procurement process:

- Guidelines for Procurement activities and Supplier administration;
- Qualification of Suppliers;
- Requisition for Suppliers;
- Invitation to Tender / Bid;
- Award;
- Follow-up;
- Administration of Materials;
- Final Phase of Procurement Cycle;
- Feed-back.

6.9 MATERIAL MANAGEMENT

Material Management is the area of the PMC aimed at ensuring that the delivery of materials is performed in accordance with prioritised Project objectives (i.e. 'the right materials") and with project plans and schedules (i.e. "in the right place at the right time").

A significant percentage of Development Project, costs are related to materials and one or. more purchased items are often on the critical path of a project. Moreover, malfunctioning equipment or materials may cause delays during both construction and star-up.

The purposes of Material Management are:

- Identification of all materials necessary to the Project;
- Ensure the availability of materials, in the right place, at the right time during project life cycle, and the required quality
- Transfer of appropriate information to Operation and Maintenance
- Management of spare parts.

The correct application of Material Management on Project prevents material shortages (due to purchase omissions, delays in supplying, deterioration, losses) or redundancies, both for operations and maintenance purposes.
Material Management should be considered as an, independent area, covering the entire: lifecycle of materials, from engineering activities through to maintenance. Material Management should allow the complete traceability of each Project item, and the correct interfaces with Procurement and with Operation and Maintenance.

- Material Management covers all aspects of the use of materials on a Project, e.g.;
- Documentation: where is the relevant documentation (technical specification, data sheet, certificate)? Is it complete?
- Procurement: what is the current status of the tender?
- Physical: what is the material's current status and what is its current location?
- Maintenance: what information should engineering team pass on the maintenance team?

Material Management is an activity based on two main deaverabies;

- Material Management Strategy
- Material Management Plan

The Material Management Strategy and Material Management Plan should be part of the Project Execution Plan.

6.9.1 MATERIAL MANAGEMENT STRATEGY

The Material Management strategy should be defined in the early stages of the Evaluation Phase, and should be finalised during the Concept Selection Phase.
A Material Management Strategy should include:

- Impact of Contracting Strategy;
- External factors;
- Coding rules;
- Information Technology aspects;
- Impact of Contracting Strategy

Impact of Contracting Strategy

The selection of the Contracting Strategy will allow the identification and allocation of Project ' Work Packages, according to chosen contracting schemes. This will make it possible to identify who is responsible for defining the complete list of items and materials, issue related orders, and following materials in all phases.
The lifecycle of materials begins with their specification in a "list of materials". Drawing up the list of materials is an engineering activity performed either internally or by contractors, depending on Contracting Strategy. Purchase activities may be started on the basis of this list of materials.
Materials can be purchased:

- Directly by Company (Shopping around);
- By Contractors (EPC);

When a “Shopping around” approach is adopted, the Project Team will be directly in charge of activities related to Material Management. Project Team involvement decreases if one of the other two approaches is adopted, particularly with the EPC approach where the Project Team only has to perform controlling activities on contractors.

External factors

The Project Team will have to identify in advance all aspects that might have an influence on the Material Management Plan, such as:

- Environmental conditions (Project location, environmental issues...);
- Warehousing / Logistics and infrastructures / transportation issues.

The clear identification of such aspects represents critical input to Project Team, not only for the preparation of a suitable Material Management Plan, but even for the success of the Project as a whole. For example, transportation issues such as long distances, lack of roads or railways, shallow water, if not properly considered at an early stage, could stop a Project for years.

Coding Rules

It is important that the Material Management Strategy establishes coding rules for materials and that it communicates them to all involved parties: A proper application of coding rules in material management activities will allow:

Information Technology aspects

The Material Management Strategy should cover all IT aspects of material management cycle to ensure:

- Correct interfacing between all internal and external players;
- Adequate traceability of materials;
- Linkage between lists, orders, documents, maintenance.

Impact on Project Organisation

The Material Management Strategy should assess and determine the impact of Material Management activities on Project Organisation on the basis of the purchase scheme and subsequent anticipated Project workload.

6.9.2 MATERIAL MANAGEMENT PLAN

The Material Management Plan starts with the definition of required materials, the preparation of material lists and the attribution of codes to each item.
Required On Site (ROE) dates shall be identified to reach single item necessary for the Project. On the basis of this information it is possible to define a critical date by which acquisition must be completed, by calculating typical delivery time (including lime from bidding preparation to awarding) for each item.
For some items, the complete identification of required materials and related ROS dates will only become available to the Project Team during detailed engineering. When this is the case, a consolidated Material Management Plan can not be produced until the Execution Phase.
It is important that Material Management Planning starts early in the Concept Definition Phase, on the basis of basic design information, in order to allow the correct and timely identification of "Long Lead Items". Long Lead Items are those items whose delivery deadline, compared with the ROS date, requires that their purchase should be initiated before the Concept Definition Phase is successfully closed, in order to avoid delays in the Execution Phase. The early identification of these items is a key success factor for the entire Development Project.
When considering purchasing before the conclusion of Concept Definition Phase, the Project Team needs to weigh up:

- Level of confidence of successful Project Sanction;
- Mitigation of unsuccessful result of Gate (i.e. by using cancellation clauses in contracts).-
- Risk Management techniques might help the Project Team in these activities,

The Material Management Plan identifies all activities to be performed to ensure that materials wilt be correctly managed during the Project lifecycle. The Material Management Plan should identify who, from within the Project Team or Contractor staff, will be responsible for each of the identified activities.
Material Management starts with the definition of the list of Materials and the preparation of the Material Delivery Schedule, and ends with Disposals Management.
Material Management Plan must be prepared, and should be constantly reviewed, on the basis of Project Plans and Schedules, paying particular attention to the integration of contractors and suppliers schedules. The ROS date is the primary input for material management planning, but the real guiding principle should be 'the right material, in the right place, at the right time The ROS date should never be overrun. This implies having to take appropriate contingencies in planning deliveries.
Equal care should be given to not having materials at the Project site too early, as this might cause:

- Negative impact on cash flows;
- Obsolescence of Materials;
- Deterioration of Materials;
- Loss of guarantees on Materials.

6.10 ECONOMICS

Economic evaluation is a technique utilised for the evaluation of economical viability of investments. Different methodologies can applied, such as "Discounted Cash Flow" methodology, etc. The following Sections will examine the aspects listed below.

- Determination of Cash Flows
- Actualisation of Cash Flows
- Calculation and meaning of economic indicators

The economic evaluations relevant to any PSA or JOA is undertaken by using Economic Model agreed between all partner of the Joint Venture and Assumptions and methodology are detailed in ad hoc documents prepared by discipline experts.

6.10.1 DETERMINATION OF CASH FLOWS

Net Cash Flows are represented by the sum of:

- Positive Cash Flows (which are function of Production Profiles, price scenarios and, in the area under PSA, transportation, costs)
- Negative Cash Flows (Capex, Opex, Taxation)

For what it concerns taxation the fiscal regime depends on the Country where the project is located and/or the agreements between Contracting Companies and Governments.

6.10.2 ACTUALISATION OF CASH FLOWS

The reference rate generally adopted in the Industry for discounting Cash Flows in order to calculate the Net Present Value (NPV) of a project is represented by the Weighted Average Cost of Capital (WACC). WACC is derived by using the following formula:

$$WACC = \frac{\sum_{I=1}^{N} r_i * MV_i}{\sum_{i=1}^{N} MV_i}$$

where:

WACC depends on many variables specific of a company and the industry / business where a company operates. As a Weighted Average Cost of Capital cannot meaningfully be derived for Consortium formed by many different oil companies. assumptions on unbiased discount rates are applied (see Project Economic Assumptions).

6.11 INSURANCE

Insurance is a way of transferring risks on to one or more insurers (or underwriters) through payment of a sum (premium) on the basis of a mutually agreed contract. Insurance is a risk management tool that protects the project from unexpected economic losses suffered as a result of physical

accidents or liability claims. The payment of .a predetermined premium removes the uncertainty of unexpected expenses. Limits and deductibles are proposed by insurers to the insured party in order to limit payment of losses and/or to contain insurance premiums. Consequently, part of the cost of damage is retained by the insured (self-insurance). It is possible to insure risks associated to economic losses (i.e. pure risks), but it is not possible to insure against speculative risks, which could generate either profit or losses. Certain occurrences leading to certain damages are not insurable, for example it is not possible to insure against damages due to manipulation of weapons.

PSA or JOA relates specific insurance conditions, in particular with reference to developments projects requires “control of well insurance covering control of well and redlining costs following loss of control of wells located in the Contract Area” and such other insurance in respect of the Contract Area and the activities of Contractor under this Agreement as would, in accordance with international oil industry practice, be maintained by a reasonable and prudent operator.

Policies normally cover Development Project activities during Execution Phase.

The process of stipulating Insurance policies may require long times and has to be adequately planned. The Project Team should start evaluating insurance needs and initiate activities related to the stipulation of policies during the Concept Definition Phase. It is important to underline that the Project Team shoal require the support of (Internal Insurance Function), during all insurance processes.

6.11.1 TYPES OF INSURANCE POLICY

Two main insurance policies are available to Project Team:

- Construction All Risks (C.A.R.);
- Cost of Control

Development projects activities are insurable under a type of cover named C.A.R. (Construction All Risks) that:

- provides a guarantee affecting the whole period of realisation of a project (engineering, procurement, construction, erection, laying of pipes, transportation, towage, lifting, hook up, commissioning, start up)
- protects all the parties involved for their activities connected with the project.

CAR policies usually provide a 12 to 24 month maintenance guarantee after start up. They include a section for TPL (Third Party Liability) claims, covering against legal liability to third parties for bodily

injury or less or damage to property arising from project activities, and for transportation of project items and equipment, either by land or. sea. Pre-existing or surrounding properties (i.e. existing sea-line crossing or tie-in to existing lines)e even if owned and operated by an insured party, are usually covered.

Drilling activities are covered by a specific policy named C.O.C. (Cost of Control of Well). This policy protects the insured party (usually the oil company) against costs incurred.. controlling the well following a blow-out, including the cost of a relief well and Of re-drilling another well near the damaged one up to the same wet depth of the damaged well The C.O.C. also covers all costs due to pollution and clean up operations.

6.11.2 INFORMATION REQUIRED TO STIPULATE INSURANCE POLICIES

In order to assess risk and stipulate an insurance. policy, Underwriters require a significant amount of information. This information must. be gathered by the Project Team and analysed with the help of the Internal insurance Function. The table overleaf shows the information required by the Underwriter to assess risk.

Due to the fact that contractual conditions (for the specific clause “Liability and Insurance”) and insurance coverage’s granted by C.A.R. policy need to be aligned, the Internal Insurance Function will be involved in all contracts from the tender phase onwards.

6.11.3 ESTIMATING INSURANCE COSTS

Underwriters evaluate Insurance premiums for Development Projects on a case by case basis. The evaluation depends on various factors, but mainly on the Project itself, the loss statistics of energy development projects in recent years and the financial. capability of the insurance industry.

However, it is possible to provide a general indication of how to estimate the premium for different insurance policies. Such an indication may allow the Project Team to reach a better estimation of Project costs during the Concept Selection and the Concept Definition Phases.

6.11.4 MANAGE CLAIMS

Project Teams must always refer to Internal Insurance Function for claim assistance once policies are stipulated.

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