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Project Management for the Oil and Gas Industry

Dr William Wallace
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Project Management for the Oil and Gas Industry

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Module 1

Introduction

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1.1 Introduction and Learning Outcomes

This module acts as a general introduction to the Edinburgh Business School (EBS) text Project Management for the Oil and Gas Industry. It introduces the main rationale behind the course and briefly summarises the main areas covered in each module. It establishes some course aims and objectives and attempts to establish an overall context within which the course should be studied and used.

Learning Outcomes

By the time you have completed this module you should understand:

• the basic aims and objectives of this course;
• what the course is about and what it attempts to do;
• the underlying logic and rationale behind the course content;
• the layout of the course;
• how this course fits with the Project Management course;
• why Project Management is a prerequisite for Project Management for the Oil and Gas Industry.

1.2 Aims and Objectives of the Course

Most people who work in the oil and gas industry would agree that the industry is changing. The world’s main oil reserves have probably all been identified and analysed and it is unlikely any major new fields will ever be discovered. There is still a major sector based on exploration and analysis, but as existing fields become depleted there will be more and more emphasis on enhanced extraction and the development of smaller and more challenging fields. In addition, a larger and larger proportion of the world’s oil will become concentrated in just a few countries and the influence of OPEC (the Organisation of Petroleum Exporting Countries) will grow as these countries are likely to be members of that organisation.
As the same number of oil and gas companies find themselves chasing a diminishing stockpile of work, so the overall levels of competition, risk and complexity are likely to increase over time. The aim of this course is to develop a knowledge and understanding of those applied project management skills that are most likely to assist practising project managers in the oil and gas industry in addressing the challenges that lie ahead over the next few years.

The objectives of this course are to develop these skills across a range of different disciplines, including:

- project management as a discipline and how it works;
- how project management operates within the oil and gas industry;
- risk and risk interdependence;
- change and change control;
- contracts and standard forms of contract;
- contract documentation;
- claims and claims procedure;
- probabilistic time modelling;
- estimating, cost planning and control;
- uncertainty and contingencies.

By the time you have completed the course you should have a working knowledge and understanding of each of these areas, together with an appreciation of how they can be used effectively in developing the project management skills necessary to meet the changes that are occuring, and will continue to occur, in the industry.

1.3 The Underlying Rationale of the Course

*Project Management for the Oil and Gas Industry* (PM2) is designed as an oil- and gas-specific extension of the *Project Management* course (PM1). It takes the basic ideas, tools and concepts developed in Project Management and concentrates on a number of key areas, developing them in more detail with a specific emphasis on the oil and gas industry. It is primarily designed for people in the oil and gas industry who are looking to develop their project management skills in areas that are of specific application in that industry.

It should be noted from the outset that many of the individual areas covered in this course are not exclusive to or restricted to the oil and gas industry. For example, the sections on contracts and contract administration include large elements on standard forms and other types of contract. These are not necessarily based exclusively on standard forms for the oil and gas industry. The sections are, however, developed with an emphasis on the oil and gas industry, with attention paid to where standard forms and other documentation can be applied within the oil and gas industry to improve performance and/or lower risk within a given application. The emphasis on the oil and gas industry is reinforced by the use of numerous mini case studies based on the industry. The course also includes a number of major longitudinal case studies that are, again, based on the oil and gas industry.

The course itself was developed in conjunction with the industry and the main areas covered are included in direct response to feedback from the industry. In researching the background to the course the author spent some time visiting company offices and oil and gas drilling sites and talking to people at all levels, from site operatives to senior managers.
This research suggested a number of areas where oil and gas companies could perhaps improve their internal project management systems and where a course like this could be of greatest value. The potential areas for improvement are covered in more detail in Module 2.

There appear to be a number of ‘common areas’ where oil and gas service companies feel their project management skills and experience could be improved. Some typical such areas are listed below.

- **Area 1 – Contracts.** This includes contracts and procurement, including standard forms, subcontracts and service level agreements. There appears to be a common perception that the contracts used in the industry are unnecessarily complex, outdated and tend to have evolved over many years. They are often developed by individual client organisations and governments and are often inflexible and unnecessarily difficult to apply. There also appears to be a general lack of understanding of contracts, with a general lack of contract administration expertise and experience within the industry.

- **Area 2 – Risk.** This includes risk interdependency, risk management and contractual risk allocation. Most people in the industry are familiar with the concept of risk and understand how to identify and respond to simple and obvious risks. The problem seems to arise when people have to start thinking about interdependent risk and how risks interact with each other. In addition, there seems to be a general lack of understanding of how risks are allocated in contracts and what impact a contract has on the risk profile facing the organisation.

- **Area 3 – Dispute.** Dispute and how to handle it is another common problem area. Negotiation skills and conflict resolution seem to be underdeveloped in the industry and there appears to be a heavy imbalance of power towards the client. There is a general absence of claims and recoveries from contractors where clients induce delays and cost increases. There seems to be an industry-wide attitude that prevents contractors from challenging clients in areas that require dispute resolution. Where disputes do occur there seems to be a general absence of the kind of dispute resolution systems that are widely used in other industries.

- **Area 4 – Change.** This includes the management of change and the impact of change on risk and cost. Oil and gas contracts often involve change. There seems to be a general lack of change control and a general attitude whereby client-imposed change is regarded as standard practice and ‘part of the job’, and a lack of contractor cost and time recovery where client-induced change results in cost increases and delays.

- **Area 5 – Cost control.** This includes estimating cost planning, control, tendering and monitoring. Oil and gas projects are often characterised by life cycles that include a number of different cost-oriented phases. It is common to encounter projects where the estimators make one set of assumptions, the cost planners make another set of assumptions and the people who implement the projects make another set of assumptions. In some cases the various sets of assumptions could be quite different, resulting in cost plans that are unachievable because they do not reflect the project as envisaged by the estimators at tender stage.

- **Area 6 – Uncertainty.** This includes the range of conditions that can be classified as uncertainty, together with typical responses such as contingencies, management reserves and risk pots. Oil and gas projects are typically affected by high levels of change and risk (see above) and as a result there is often a considerable amount of uncertainty within the overall risk profile. Organisations in the industry appear to have good control systems for uncertainty in some areas, such as health and safety, but not in other areas, such as
cost planning and control and time planning. As a result, both the identification of uncertainties and the responses put in place often tend to be less than optimal.

The course itself was structured to address these main areas. It is apparent that some of the areas cross more than one discipline and/or subdiscipline. For example, the general area of contracts covers a wide range of different areas for consideration, such as risk and risk profile, type of contract and relevant legal system, the nature of the client and relationship with the contractor. The course, therefore, had to be set out over a larger range of individual subject areas. These are considered in the next section.

1.4 The Structure and Layout of the Course

The course has been designed to address the areas listed above. The course starts with this basic introduction followed by modules on project management as a concept (Module 2) and a general module on the oil and gas sector (Module 3). The remaining modules are then subject-specific. Modules 4 and 5 cover risk and change. Modules 6 and 7 cover contracts, contract documentation, and standard forms of contract. Module 8 then develops these areas by looking specifically at contractual claims for extension of time and direct loss and expense. Module 9 considers probabilistic time modelling, as this approach is widely used in applied project management in drilling and completion projects. Module 10 considers estimating and earned value-based cost control. Module 11 considers uncertainty and contingency planning. Module 12 onwards contain detailed longitudinal case studies that are designed to apply the theory covered in the main modules to applied examples.

The overall layout, therefore, is as shown below.

- **Module 1: Introduction.** This module sets the course in context, establishes how it sits with PM1 and identifies the main aims and objectives of the course, with the learning outcomes. It stresses how the course forms part of a larger overall programme of courses that are under development.

- **Module 2: Project Management as a Concept.** This module builds on the project management theory covered in PM1. It covers project management as a discipline and goes through a series of reasons why project management is so important in the oil and gas industry and why oil and gas companies increasingly need to make use of project management tools and techniques to obtain and then maintain competitive advantage. The module also covers international project management standards and professional qualifications in the context of the oil and gas industry.

- **Module 3: The Oil and Gas Sector.** This module establishes the background to the industry in which the course is set. It goes through the main characteristics of the oil and gas sector and considers some current and likely future issues for the global oil and gas sector and why effective programme and project management are so important to international oil and gas service companies.
• **Module 4: Project Risk Interdependency and Contractual Risk Allocation.** This module looks at risk interdependency and enterprise-wide risk management systems (EWRMS). This module introduces the idea of developing enterprise-wide systems for risk management based on full risk interdependency field analysis, where the impact of a change in one risk level is fully modelled in terms of what that change does to the overall risk profile for the organisation.

• **Module 5: Project Change and Change Control.** This module addresses the important issue of change. It goes through the various internal and external sources of change and examines the standard contractual and non-contractual provisions for change. The module examines the mechanism for change notices and variation orders within contracts and looks at some of the rules and procedures used for valuing such contractual changes. The module also reviews standard methods for recording variations, and variation valuations for interim and final payment.

• **Module 6: Contract Documentation.** This module summarises some of the main types of contract documentation likely to be encountered on major projects. It goes through the various different documents from bills of quantities to contract specifications and discusses the main structure and format of each one together with its individual function and how the various documents work together to define the project statement of works.

• **Module 7: Standard Forms of Contract Terms and Conditions.** This module introduces some basic contract theory and issues some basic definitions. It goes on to introduce the concept of the standard conditions of contract and then goes through some example clauses and terms and conditions from standard forms to illustrate their potential application in the oil and gas industry. The module examines sample clauses on a range of different issues from certification and payments to suspension of the works by the contractor and/or client.

• **Module 8: Project Claims and Claims Procedure.** This module goes through the idea of claims and establishes typical process and procedures to be followed in the event of a claim arising. The module goes through the various likely grounds for a claim (from both the contractor and client perspective) and goes through claims procedure, grounds for claims, force majeure, relevant events, claimable items for reimbursement of direct loss and expense, heads of claim, preparation and submission of a claim.

• **Module 9: Probabilistic Time Modelling and PERT.** This module introduces the idea of probabilistic time estimating and tradeoffs. Oil and gas projects by their nature tend to be probabilistic rather than deterministic and any tradeoff calculations tend to be based on windows of potential and likely times rather than absolute deterministic values. The module includes a number of detailed worked examples to illustrate the detail of the calculations.

• **Module 10: Project Estimating.** This module considers EVA-based approaches to estimating and cost control. It goes through the concept and application of computerised database estimating systems and examines the use of EVA-based cost control techniques in the oil and gas industry. It introduces the concept of integrated estimating and cost control systems.

• **Module 11: Project Uncertainty and Contingency Planning.** This module reinforces the concept of residual risk and considers typical areas of uncertainty and residual risk in oil and gas projects. The module covers the various types of unforeseen and unforeseen risk, contingency planning, disaster recovery planning, contingency analysis and provision, management reserves and contractual provisions such as warranties and bonds.
• Module 12: Longitudinal Case Study 1. This is a major case study based on an oil and gas drilling and completion project that applies each of the individual subject areas addressed in the modules. It involves a series of change notices and other types of information that require the student to re-plan and adjust the programme of works as necessary. The changes also result in time delays and cost increases. The reader has to determine which of these are claimable and then go on to build up a comprehensive and robust claim to recover as much cost as possible.

• Module 13: Longitudinal Case Study 2. This is another major case study, this one covering an entirely different area and range of considerations. It is based on a fictional oil field exploration company called Pentland Oil and Gas. The company decides to make a major shift in its operational strategy and the case study considers the various risk implications that go along with this transition. The case study covers a range of different risk-based issues from scenario planning to strategic drift.

• Appendix 1: Outline Solutions to Mini Case Studies. This module presents a series of outline answers to the various mini case studies that are positioned within the main body of the text.

1.5 Relationship with the Project Management Course (PM1)

1.5.1 A Reminder of the Structure of PM1

The Project Management course is a generic introduction to project management. It is aimed at people who have little or no project management knowledge or experience. It introduces the concept of project management as a discipline and develops a basic background knowledge of the main areas requiring design, planning and control on projects. These are as follows:

• Project Management Module 1: Project Management Conceptualisation – the idea of project management as a discipline, projects as one kind of production system, projects having a single aim and a number of different objectives, project life cycles, multidisciplinary teams and multidisciplinary team development.

• Project Management Module 2: Individual and Team Issues – working with and managing people both individually and as part of a team, communicating effectively, motivating people, setting realistic targets and measuring performance.

• Project Management Module 3: Project Risk Management – understanding risk and opportunity, making decisions under conditions of certainty, risk and uncertainty, understanding the risk profile, understanding risk management systems and risk management system design.

• Project Management Module 4: Organisational Design – setting up and managing project teams, understanding internal and external project management structures, appreciating the role of the project and functional managers and project sponsor, understanding organisational communication, authority and contractual networks.

• Project Management Module 5: Project Time Planning and Control – developing an understanding of the processes involved in developing a draft master schedule from a statement of works including developing a precedence diagram, logic-driven and resource-driven scheduling, producing a draft master schedule using CPM and PERT approaches, tradeoffs and producing a project master schedule.
• **Project Management Module 6: Project Cost Planning and Control** – developing and understanding reliable project cost plans and control systems so actual cost can be tracked and compared with planned cost to isolate variances, especially using EVA to provide combined cost and schedule performance data.

• **Project Management Module 7: Project Quality Management** – covering a range of levels within quality management from the higher level strategic overviews involving the traditional philosophies and views down to the more detailed quality management system design issues.

• **Project Management Module 8: Case Study** – a longitudinal case study developing all the main areas listed above within a single generic longitudinal case study. The overall solution requires detailed application of each of the areas covered in Modules 1–7 plus an overall level of integration across disciplines.

1.5.2 **Why Completion of PM1 Is a Prerequisite**

Project Management for the Oil and Gas Industry is integrated with, and develops directly from, Project Management. It is imperative that anybody undertaking PM2 does not do so until he or she has completed PM1. There are a number of very good reasons for this limitation.

• PM2 is effectively an oil- and gas-focused extension of PM1. It takes the generic introductory areas of the *Project Management* course and develops them with an oil and gas emphasis.

• Many of the terms, phrases and tools used as standard in PM2 are introduced and explained in PM1. For example, it is essential to understand the detailed mechanics of PERT analysis (*Project Management* Module 6) before attempting the acceleration calculations detailed in Project Management for the Oil and Gas Industry Module 9.

• PM1 establishes an appreciation and understanding of the integrated and interdependent nature of the discipline that is essential for an understanding of the applied areas covered in PM2.

• A number of areas covered in PM2 are direct extensions of where PM1 ‘left off’. For example, Project Management for the Oil and Gas Industry Module 4 on risk interdependency is a direct extension of Project Management Module 3 on project risk management.

• The case studies developed in Project Management for the Oil and Gas Industry Modules 12 and 13 are based on the same format as the case study developed in Project Management Module 8. It is necessary to complete and understand the mechanics and procedures involved in the generic Project Management case study before attempting the oil and gas sector-specific case studies in Project Management for the Oil and Gas Industry Modules 12 and 13.

• The Project Management examination assumes and requires a knowledge and understanding of the areas covered in the *Project Management* course. Parts of the answers to questions in the Project Management for the Oil and Gas Industry examination require elements that are contained in PM1 and not in PM2.
Learning Summary

This module has introduced the course and has established the overall rationale behind the course content and structure. The module has made it clear that the course was developed systematically following a period of research within the oil and gas industry. The course structure reflects the issues and potential areas for improvement that were identified during that research.

Module 2 considers project management as a concept in the oil and gas industry. It builds on the main areas covered in *Project Management* Modules 1 and 2.