

# Project Studies – Setting it up for Success

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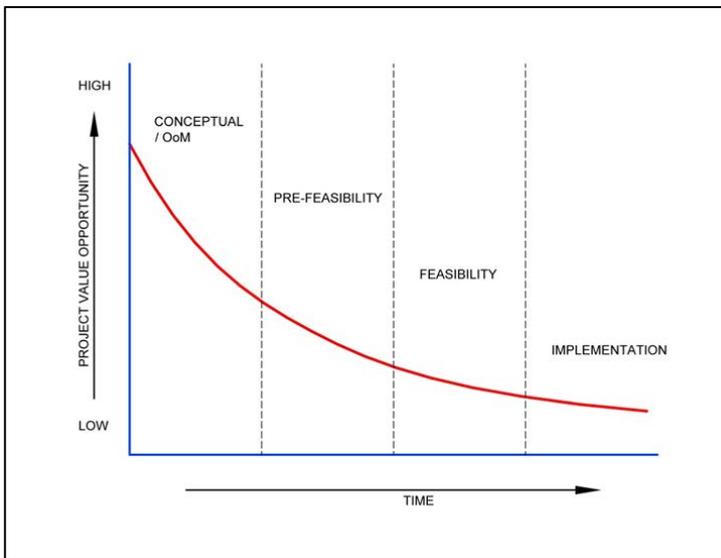
## Introduction

In the current resources environment, where market factors dictate that a resources company bring a product to market as quickly as possible - the planning and implementation of a project is critically important. At times, the observed experience within the industry of how project pre-implementation studies are carried out demonstrates study execution quality issues. This in turn, reinforces why best practice project study plans can and should be applied.

There is an old adage about “setting it up for success”. With the advent of ever more challenging ore bodies and with that, challenging projects, this adage seems more important today. The industry now has to tackle the challenges from an in-ground resource and human resource quality and availability. In addition, projects are being pushed by market forces – market expectations and corporate promises. This means that in particular, the critical front-end work of carrying out efficient project studies is under pressure. This can lead to shortcuts being taken in traditional study programmes, resulting in suboptimal outcomes as well as increased study (and project implementation) costs, often due to repetition of work and the resulting inefficiency.

It is unfortunately more common to see studies reaching Feasibility Study (FS) level without having understood and answered all of the options at a Pre-Feasibility Study (PFS) level. This creates an inefficient FS process due to unanswered questions and the consequential scope ambiguity.

Figure 1 depicts the project study life cycle. As can be seen, the opportunity to add value decreases with time, as the level of study increases.



**Figure 1: Project Study Life Cycle**

On the basis that setting a project up for success relies on carrying out a professional, detailed project study, the industry needs to reflect on how well study work is carried out and the time that is required.

## Study Types

For a number of reasons, studies are tending to merge across phases of study and the overall time to implementation is being compressed. This erodes the opportunity to progressively add project value and more often than not compresses the study life cycle into a challenging timeframe for completion.

It is worth reviewing the typically required levels of studies.

### Conceptual/Order of Magnitude Study

These studies typically have limited information and make a preliminary assessment of the project value using high level assumptions with the aim of assessing the “size of the prize”. If the prospect warrants, further investigation, a serious commitment to funding an acquisition or resource drilling is often required.

## Pre-Feasibility Study

This phase of study typically carries out option studies and field work programmes to gather data to support final mine design. The aim of a PFS is to reduce the range of viable options to a single option for progression into a FS.

## Feasibility Study

The FS is the finalisation of a business case for the preferred project option, as defined in the final phase of the PFS stage of study. This work leads to a project investment decision and is based on the final optimisation and engineering design of the preferred case.

## Ideal study process

As depicted in Figure 1, an ideal study is a gated process that methodically collects and analyses data so that by the time a FS level is reached, the project can proceed on a “one option” basis, with the knowledge that there is already inherent project value in place.

The concept that options can still be effectively studied while proceeding to finalise a FS does not easily work in today’s challenging projects and leads to circular work flows and increased study costs. An often overlooked effect is study team frustration, that in turn can lead to suboptimal outcomes.

If the gated process is followed, the scope can be progressively refined, eliminating less valuable options and allowing more value adding options to be progressed.

In carrying out a study, the effect of the Triple Constraint needs to be recognised. As can be seen in Figure 2, the quality of a study is dependent on the scope, cost and schedule all being in balance. If any single component is changed, the other two components will need to be adjusted to maintain the quality of the project.



**Figure 2: The Triple Constraint**

Study teams today are often made up of multiple entities, particularly within the mid-tier and junior resource companies. Depending on the owner’s resources, there may be an owner’s team leading and coordinating technical study specialists. In some cases, consultants may be carrying out the full study works for the owner. In any event, it is critical that leadership coordinates the multiple stakeholders through solid project management, particularly around scope definition and management.

Where it is required to effectively combine the PFS and FS phases, careful thought is required to schedule out the required activities such that a complete FS is produced. This work also needs to be supported by active scope definition and project management.

## The Challenges

The following project study areas are seen as challenging and need to be given thought in terms of study execution.

### Project Direction

Project leadership is critical for a successful study outcome. In some projects, corporate direction is driven by market satisfaction, as opposed to providing sound direction internally and to external stakeholders that are carrying out technical studies. These projects tend to “wheel spin,” lack direction and repeat work cycles due to incomplete technical input data. This typically occurs within ever decreasing time lines, given that promised delivery dates to the market are hard to move.

## Historical Resource Knowledge

A number of projects are now under study on the basis of historical resource drilling by previous owners. Careful analysis of the quality of this historical data is required to support the current Resource Estimates being produced. If the data is incomplete, then additional statistical review, drilling programs and/or confirmation drilling (twinning) is often required, which at times is not factored into study timelines and leads to unexpected project study delays.

## Orebody Knowledge

Studies that proceed without a complete orebody knowledge are unnecessarily challenging. A case in point is having inadequate knowledge of product contaminants that if misunderstood, create unexpected product discounts. This leads to a loss of project value and as a consequence, pressure on all other areas of the study to reclaim the expected or promised project value.

A similar situation arises when a resource insitu grade proves to be challenging and a study proceeds on the basis that the resultant product can be sold. At a later stage, the study is presented with marketing issues, which generally impact expected revenue. At this stage, study work has to be reversed and re-scoped to accommodate the newly disclosed marketing requirements.

Product knowledge and marketing research are therefore vital early in a project.

## Project Drivers

The key project drivers should be clearly identified early in any study. One particular study proceeded into FS on the basis that mineral processing was the key driver, when in fact ore body quality and in turn mine planning was the key driver. This resulted in an “about turn” during the FS study in order to significantly increase mined tonnages and produce a blended product – at great expense to the project, in time and money.

## Study Workflow

The current trend in shorter study timelines increasingly dictate that various tasks must be progressed in parallel. It needs to be recognised that in doing so, there is an associated increased risk profile for the study. A key element of this risk is that there is reduced opportunity to pass on key information to other technical disciplines such that they can use this information to appropriately and with confidence, progress their components of the study.

As an example, open pit mine planning relies on a circular workflow of cost determination, optimisation, pit design and scheduling, to progressively feedback more accurate costs as optimisation inputs.

In an open pit FS study where technical disciplines are progressed in parallel, key inputs such as the initial production schedule are not available for the metallurgical and processing teams. These teams consequently use assumptions to progress their portions of the study in isolation. This approach results in misaligned cost and physical parameter inputs for the project. In many cases this misalignment is only realised when the individual technical studies are merged later in the study, creating unnecessary issues and rework for project valuation.

## Discovery

It should be recognised that “discovery” will occur during a study, to a greater or lesser degree, depending on the level of study. It is critical that this new information that comes to hand is formally captured. The implications need to be assessed by the project teams and study plan adjustments made accordingly. Too often, projects do not react to this new information and the study has to play “catch up” when the impact of the new information is realised.

## Budget constraints

It is not uncommon for concurrent drilling programs to be required for resource, hydrogeology, metallurgical and geotechnical information. Cash constrained projects in particular need to recognise the early need of this information and plan the use of scarce resources such as drill rigs and personnel, and define how and when the required information will be obtained. A single diamond drill hole can be used for multiple study tasks if planned accordingly. There are opportunities, with good planning, that will allow information from a particular work program to be utilised across a number of study areas, while maintaining an adequate level of completion for the phase of study and not impact project risk or value.

## Water Studies

Water is an ever increasing challenge; to identify quality and quantity, access and dispose of. The lead time for this work is often underestimated. In particular, for obtaining enough data to build groundwater models that can support project planning aspects, particularly dewatering timing and to address water disposal issues.

## **Risk Assessment**

It is not unheard of for a project risk assessment to be carried out at the last minute due to a request by a potentially funding institution during a Due Diligence review. The obvious flaw is that an inherent risk could have been overlooked during the study, to the point where it could present a serious approval risk. A Risk Assessment should be a continuum of work throughout the study, so that risks are progressively identified and managed. If a risk is identified early in the study, then there is an opportunity to engineer it out with minimal impact to the project timeline and cost.

## **Study Presentation**

Where a number of independent stakeholders are involved in carrying out study work, care must be taken in the ownership of the final study works. It is critical that all stakeholders have a common understanding of the final project requirements so that a coherent business case is presented.

The time required to prepare and compile the final study report should not be underestimated, particularly for a FS. Inadequate time allocated to this task can result in a compression of the last stages of the study so that a delivery deadline can be achieved, invariably risking a lower quality output.

## **Project Implementation Planning**

Once a FS is completed and on the basis that the project will then be approved, a critical aspect is to have prepared an achievable Project Implementation Plan (PIP). This PIP should be prepared in adequate detail, across all project development/construction areas and be the foundation for project execution once funding is approved.

## **Setting it up for success**

Steven Covey's Habit #2 is "Begin With The End In Mind" which seems even more important as it becomes increasingly challenging to create project value within the resources industry. The pool of experienced human resources is tightening and is being spread over a wider base. If that is the reality that we work in, then it is critical that projects be set up for success at the front end by carrying out the necessary studies. In doing so, there needs to be an awareness of the current challenges and mistakes being made within the industry.

Recognising this, will allow for future phases of studies to progressively "start higher up the curve". This will provide a smoother journey through to a final project study completion and allow a project that has true value to be set up for success and recognise its full potential.