

A Framework for Presenting and Benchmarking Resource Projects

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Abstract

Investors and other stakeholders assessing the risk, opportunity and relative value associated with a resource project need to appreciate the project in its correct context. Errors, omissions, biased reporting or conflicting information in project reporting may lead to a misinterpretation of technical and financial results, resulting in biased estimates or assumptions on project value.

This paper provides a simple 'Resource Project Framework' for presenting a project's status that may be readily benchmarked against other similar projects and to illustrate the stages required to advance the project outcomes to higher levels of certainty. The framework draws on definitions and guidelines readily available in various resource industry reporting codes and public company reporting requirements.

The framework assesses three key areas for placing a resource project in its correct relative context, namely:

1. the project development stage
2. the confidence in the Exploration Results, Mineral Resources and/or Ore Reserves
3. the level of accuracy, precision and confidence in the technical and economic studies supporting the reported results or options for the project.

The application of the Resource Project Framework is illustrated using two project examples, one from publicly reported company project releases and the other for two development projects.

Introduction

Mining is an inherently risky business – from the technical, environmental, social and economic uncertainties associated with advancing an exploration prospect to a viable project, to the operating, market and safety risks and uncertainties attached to a developed mine.

Since we cannot totally escape the risk and uncertainty related to resource projects, as professionals within our industry we should improve our presentation of the upside and downside risks in the context of the project's development path and maturity. More transparent, consistent and balanced views of technical confidence to better inform both internal and external stakeholders about the expected risk in the project are at the centre of international reporting codes such as the JORC Code (JORC, 2012), SAMREC Code (SAMREC, 2009) and Canadian National Instrument 43-101 (Canadian Securities Administration, 2011) reporting requirements, as well as public company reporting requirements such as the Australian Securities and Investments Commission and the Australian Securities Exchange (ASX).

However, despite the definitions and guidance on the reporting of Exploration Results, Mineral Resources, Ore Reserves and project details, the technical and economic study outcomes and project attributes are not necessarily reported consistently in the public domain with respect to the confidence (accuracy and precision) in such estimated outcomes. Similarly, the stages and associated risks inherent in advancing a project to its next level of decision-making are also not always clearly presented or articulated. The key term here is 'estimated'. Inconsistencies in clearly relaying the expected accuracy, precision and confidence in the project estimates at various stages of development may result in misleading or incorrect interpretations of the project risk by those relying on this information.

Further, while we expect all stakeholders involved in interpreting or relying on publicly reported project information to be familiar with the reporting codes and guidelines, this is not always the case. Despite the

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reporting codes and guidelines being relatively brief documents, some stakeholders relying on publicly reported results tend to skim the contents of the codes or selectively focus on sections deemed most applicable to the circumstance. This is further complicated by differing, sometimes subjective, interpretations of the codes and guidelines by the reporting entity motivated to present a project in either a conservative or an optimistic way, depending on their role in the project.

Inconsistent reporting of key project assumptions and estimated outcomes across the industry means that those relying on the publicly reported project information at face value may not be fully aware of the risks or opportunities inherent in this data and thus not be in a position to make an informed decision on the reported values.

Investors and other stakeholders assessing the risk, opportunity and relative value associated with a resource project need to appreciate the project in its correct relative context. A more balanced assessment of a project's technical and financial estimates and status may help protect against the possibility of misinterpreting the information and biasing estimates or assumptions on project status and value.

The process of presenting a project in a balanced Resource Project Framework requires the key attributes of the project to be critically and objectively reviewed. At a high level, the information may be sourced from public reports, access to detailed supporting reports or the outcomes of a due diligence process. Cross-checking the reported project outcomes against various sources of the project's history, tempered with professional experience and judgement, are required when using the framework. Such a review may challenge the sometimes emotive or over-confident reporting by a project's proponents or, alternatively, instances where a company may appear to be holding back on reporting a project at a more advanced level. This objective critique is important to external stakeholders as it may identify conflicting information in the company's reporting, thus providing further insight into a company's strategy for that resource.

Project Context

Public reporting requirements by listed entities and/or professionals are governed in Australia by codes or guidelines such as the JORC Code (JORC, 2012), VALMIN Code (VALMIN Committee, 2005) and the ASX Listing Rules (Australian Securities Exchange, 2014). These requirements provide for improved transparency in the reporting of material project criteria and should allow stakeholders to readily assess and benchmark a project's status. In particular, a project needs to be considered in the context of its reported technical and economic assumptions and estimated outcomes with respect to their confidence, development stage and associated risks and opportunities. Where the expected information is not readily available, not clearly reported or perhaps even contradictory, this data, or absence of data, may equally inform interested parties about the relative context and confidence of the project.

The key considerations available from publicly reported information are discussed in the following sections, before these criteria are combined into a Resource Project Framework for presenting a project's status in its correct relative context.

Exploration Results, tonnage and grade estimates

The current edition of the JORC Code (JORC, 2012) provides definitions and guidance to support the transparent reporting of Exploration Results, Exploration Targets, Mineral Resources and Ore Reserves. The Code includes guidance on the consideration of Modifying Factors and the completion of Scoping, Pre-Feasibility and Feasibility level technical-economic studies. The JORC Code does not discuss the use or reporting of historical or foreign estimates or the reporting of Production Targets; these are covered by the ASX Listing Rules.

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The reporting of Exploration Results during early to advanced stages of exploration includes the reporting of both relevant sample results and Exploration Targets. As the project advances to predevelopment and Resource assessment, the tonnage and grade estimates are informed with sufficient data and assessments of technical and economic criteria to allow the reporting of Mineral Resources and Ore Reserves. The reported Ore Reserve will include a viable mine production schedule at the relative accuracy of a Probable or Proved Ore Reserve.

It is important for stakeholders relying on a reported Mineral Resource to consider that this means the Resource must have 'reasonable prospects for eventual economic extraction'. The JORC Code states this:

... implies an assessment (albeit preliminary) by the Competent Person in respect of all matters likely to influence the prospect of economic extraction including the approximate mining parameters. (JORC, 2012)

Some argue the consideration of 'approximate mining parameters' is too restricting or conservative for defining a Mineral Resource and akin to the consideration and application of Modifying Factors required for defining an Ore Reserve. Others selectively apply this economic assessment when defining Indicated and Measured Resources, but not when defining Inferred Resources. There are then cases where the interpretation of 'eventual economic extraction' has been stretched to speculate on mining methods, metallurgical extraction or land access that may in the future be possible, but are as yet not demonstrated, available or viable. These extremes, or even more subtle variations, in interpreting the Resource definition and Resource confidence criteria can result in materially different reported Resource categories and even different quantities and grades of total Resources for the same deposit (Noppé, 2014). While the JORC Code does not prescribe how a Competent Person should carry out their assessments, it does provide definitions and guidance to facilitate consistency and transparency of the factors to be considered and reported in order to avoid, or at least explain, such obvious differences in interpretation.

Consider another general example. The JORC Code defines that Ore Reserves must be derived from the Indicated and Measured portions of a Mineral Resource through the consideration of Modifying Factors assessed at the level of at least a Pre-Feasibility Study. This does not necessarily mean that all the Measured Resources will convert to Proved Reserves (or the Indicated Resources to Probable Reserves), as illustrated in Figure 1. In order to report the Reserves, the assessment must demonstrate a technically achievable and economically viable mine plan and production schedule for the reported Ore Reserves. Equally important, the level of confidence in each of the relevant Modifying Factors must support the confidence category of the Ore Reserve.

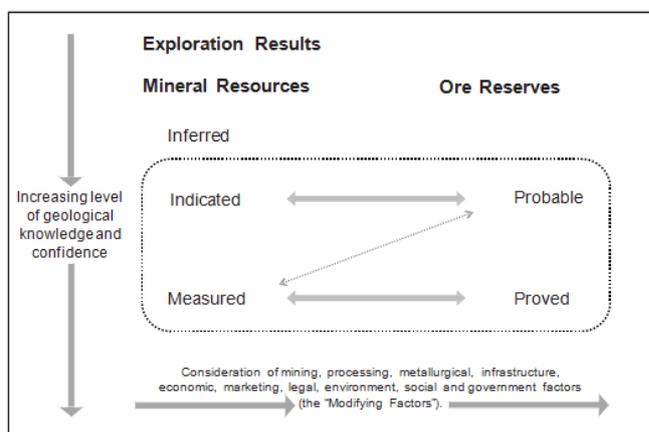


FIG 1 – General relationship between Exploration Results, Mineral Resources and Ore Reserves (JORC Code 2012)

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It is quite possible that a lower level of confidence in only one material Modifying Factor may mean that the relevant portion of the Measured Resource may be better classified as a Probable Reserve than a Proved Reserve or, in an extreme case, that the Resource may not convert to an Ore Reserve at all with the current assumptions. Downgrading the reported confidence recognises the material impact that a Modifying Factor can have on the technical or economic viability of the project at the time of reporting.

Transparent and consistent reporting of the key Resource and Reserve assumptions will allow those relying on the reported results to be aware, at least at a high level, of the relevant assessment status and confidence inherent in this data. While the JORC Code requires the significant assumptions to be reported and justified, extending the reporting to include a discussion of the sensitivity of the estimated Resources and Reserves to changes in the assumptions would be useful. Poorly reported or supported data may not allow the stakeholder assessing the information to make an informed decision about the project's relative status/value.

Additional information on the relative accuracy or confidence in the reported Mineral Resource, Ore Reserve and the technical studies is recommended by the JORC Code, which provides the following guidance:

Where a statement of the relative accuracy and confidence level is not possible, a qualitative discussion of the uncertainties should be provided in its place. (JORC, 2012)

Stakeholders should look for clear disclosure by the project's proponents of the expected accuracy and confidence in reported Inferred, Indicated and Measured Mineral Resources; Probable and Proved Ore Reserves (and mine schedules); and indeed the outcomes of Scoping, Pre-Feasibility and Feasibility Studies. Where this clear disclosure is not provided, the assessor may be justified in questioning the face value of the reported results and why the 'if not, why not' reporting guidance of the JORC Code has not been followed.

Technical-economic study types

Like other industries, the resources industry seeks to convey confidence (accuracy, precision and risk) in study outcomes through the level of detail of the particular technical and economic study.

The levels of study reported in both private and public announcements, and subsequently the expectation of the reliability in the study outcomes, is generally conveyed by the study name, for example Scoping Study, Pre-Feasibility Study or Feasibility Study. The final Feasibility Study is sometimes referred to as a 'Bankable Feasibility Study' or a 'Definitive Feasibility Study'.

While these three main study types are defined in the JORC Code, the Code does not quantify the expected accuracy of the inputs and outputs from these studies. Unfortunately, public reporting of study results is seldom accompanied by a definition of the study details and very rarely by any discussion on the expected levels of accuracy, precision and confidence in the reported estimates of tonnage, grade, commodity or financials, be it costs, revenue or profits. In the absence of such a discussion, the assessor expects the levels of study and confidence to be as defined in the relevant reporting codes and guidelines. Unfortunately, inconsistent use of study terminology by project proponents (for example referring to a Feasibility Study when the study is really at the level of a Pre-Feasibility Study or Scoping Study) conveys an incorrect, more confident expectation of study outcomes than may be warranted.

One way to ascertain the intended level of study is to consider the stage at which a project advances from an 'aspirational' project to one that is considered to be strictly 'data driven' (Noppé, 2014). 'Data driven' project studies may be considered to be projects supported by extensive and good quality data, technical studies and engineering design at particular levels of detail, as is the case for Pre-Feasibility and Feasibility Studies. However, a Scoping Study may be considered to be largely 'aspirational' since, although it is generally partly

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data driven (it may be based on Inferred Resources or better), it may be effectively conceptual in regards to its technical and economic assumptions.

The JORC Code provides terminology, definitions and guidance on the reporting of Exploration Targets, Exploration Results, Mineral Resources and Ore Reserves, and indeed on the meaning of Scoping Studies, Pre-Feasibility Studies and final or full Feasibility Studies. The requirements of the JORC Code to report the material assumptions and supporting information on an 'if not, why not' basis provides for greater transparency and consistency in reporting by a project's proponents.

The definitions of study types provided in the JORC Code are similar to those in other international reporting codes. For quick reference, the JORC Code definitions are repeated here:

- *A Scoping Study* is an order of magnitude technical and economic study of the potential viability of Mineral Resources. It includes appropriate assessments of realistically assumed Modifying Factors, together with any other relevant operational factors that are necessary to demonstrate at the time of reporting that progress to a Pre-Feasibility Study can be reasonably justified.
- *A Preliminary Feasibility Study (Pre-Feasibility Study)* is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on the Modifying Factors and the evaluation of any other relevant factors that are sufficient for a Competent Person, acting reasonably, to determine if all or part of the Mineral Resources may be converted to an Ore Reserve at the time of reporting. A Pre-Feasibility Study is at a lower confidence level than a Feasibility Study.
- *A Feasibility Study* is a comprehensive technical and economic study of the selected development option for a mineral project that includes appropriately detailed assessments of applicable Modifying Factors, together with any other relevant operational factors and detailed financial analysis that are necessary to demonstrate at the time of reporting that extraction is reasonably justified (economically mineable). The results of the study may reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. The confidence level of the study will be higher than that of a Pre-Feasibility Study.

The completion of a Feasibility Study does not mean there is no more technical work to be done before beginning project construction and commissioning. For most deposits, a Measured Resource and Proved Reserve do not provide sufficient detail for short-term mining control. Furthermore, a project requires additional detail in terms of final engineering design during its development stage to improve the accuracy and precision of the results for planning, contracting, costing and construction purposes.

When conducting technical studies, from Scoping Studies through to final Feasibility Studies, it is essential the expected accuracy of such studies are appropriately matched to the accuracy and precision of the cost estimates and also to the level of confidence in the underlying asset, namely the Mineral Resource and Ore Reserve. The level of technical study needs to convey the appropriate risk and opportunity profile of the project to the stakeholders. For example, it is completely misleading to report a resource project at a final Feasibility Study level if there are insufficient Measured and Indicated Mineral Resources and Proved and Probable Ore Reserves defined to support the minimum economic mine life, regardless of what level of detail is reportedly available on other inputs, such as equipment costs or processing plant (Noppé, 2014).

Over recent years, the need to maintain rigour in conducting robust technical and economic assessments has been under pressure, with fast-tracking employed to keep timelines and costs down

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and to take advantage of commodity demand and price cycles. In some instances, the fast-tracking approach may mean that alternative scenarios normally identified during Scoping phases and pursued as options during Pre-Feasibility assessments have not been fully considered before advancing to the final Feasibility Study. In such cases, the final option pursued in the Feasibility Study may be suboptimal. Stakeholders should be informed if higher levels of uncertainty are associated with the outcomes of some of these fast-tracked studies to allow them to properly assess the associated project risks.

The international Mineral Resource and Ore Reserve reporting codes and guidelines do not quantify the level of accuracy, precision or associated uncertainty/risk expected to be conveyed by the various technical study types. However, some rules of thumb for the levels of accuracy, expressed as confidence intervals, expected from the three main levels of study are presented in Table 1 (after Parsons, 1999; McCarthy, 2003; Pincock, 2004; Barton, personal communication, 2005;

MacFarlane, 2007; Hatch, 2010; Bullock, 2011; AACE International, 2012). The levels of accuracy expressed in Table 1 are at an assumed 90 per cent confidence level (Noppé, 2014), where, for example, a ± 15 per cent accuracy interval at 90 per cent confidence limit means there is a one in 20 chance for the result to be less than 85 per cent of the estimate and a one in 20 chance that it will be 15 per cent higher than the estimate. As many in the industry are aware, it is more common for the estimates to err on the low side, rather than for these estimates to be a central base case.

TABLE 1

Rule of thumb accuracy levels for technical studies (assumed 90 per cent confidence).

Measure/Item	Scoping Study	Pre-Feasibility Study	Final Feasibility Study
Cost accuracy	$\pm 25-50\%$	$\pm 15-25\%$	$\pm 10-15\%$
Cost contingency	30–50%	15–30%	<15%
Proportion of engineering complete	<5%	<20%	<50%
Resource categories	Mostly Inferred	Mostly Indicated	Measured and Indicated
Reserve categories	None	Mostly Probable	Proved and Probable
Mining method	Assumed	General	Optimised
Mine design	None or high-level conceptual	Preliminary mine plan and schedule	Detailed mine plan and schedule
Scheduling	Annual approximation	Three-monthly to annual	Monthly for much of payback period
Risk tolerance	High	Medium	Low

Project development stages

It is important to remember that the purpose of advancing prospects and projects and developing mines is to achieve a profitable business outcome. It is therefore essential to present and discuss a project's stage or maturity when interpreting reported Mineral Resource and Ore Reserve statements.

The Australasian VALMIN Code (VALMIN Committee, 2005) classifies mineral assets according to their maturity in the following project development stages: Exploration, Advanced Exploration, Predevelopment/Resource, Development and Operating/Producing. These development stages are outlined in Table 2.

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TABLE 2

Mineral asset development stages (VALMIN Committee, 2005).

Project development stage	Criterion
Exploration areas	Mineralisation may or may not be defined, but where a Mineral Resource has not been identified.
Advanced exploration areas	Considerable exploration has been undertaken and specific targets identified. Sufficient work has been completed on at least one prospect to provide a good geological understanding and encouragement that further work is likely to result in the determination of a Mineral Resource.
Predevelopment/resource	Mineral Resources and/or Ore Reserves were identified and estimated. A positive development decision has not been made. This includes properties where a development decision has been negative and properties are either on care and maintenance or held on retention titles.
Development	Committed to production but not yet commissioned or not initially operating at design levels.
Operating	Mineral properties, in particular mines and processing plants, that are fully commissioned and in production.

Logically, as a prospect or project advances along the development stages outlined in Table 2, the understanding of the project's risks and opportunities improves with more and better-quality technical data collected and assessed through increasing levels of rigour and detail in technical and economic studies. The increasing level of project maturity reflects the increasing level of certainty in the estimated project outcomes. However, it should be recognised that the reported outcomes are 'estimates', and while they are effectively reported as single values, they would be more correctly reported as ranges. For example, the JORC Code requires an Exploration Target to be reported as a range to reflect its uncertainty, when in fact a Mineral Resource and Ore Reserve would also be better reported as a range, albeit the range becomes smaller as the project advances and confidence increases. Except in the case of aspirational projects, namely those at an Exploration or Advanced Exploration stage, where share prices may be driven in part by sentiment, it may be reasonable to expect the value of the project to increase with the increasing information and confidence level of each development stage.

Foreign and historical estimates

The ASX Chapter 5 Listing Rules (ASX, 2014) set out additional reporting and disclosure requirements for mining, oil and gas production and exploration activities for listed entities.

In particular, the listing rules provide greater prescription and clarity regarding mining company disclosures regarding material results and the disclosure of assumptions and methods using the 'reasonableness test' on an 'if not, why not' basis. The 'if not, why not' basis is also the test applied for reporting under the JORC Code.

Under the ASX Listing Rules, public reports are prepared for the purpose of informing investors or potential investors and their advisers on Exploration Results, Mineral Resources and Ore Reserves.

Entities must report on 'material mining projects', which are considered to be projects of an economic interest (whether wholly or jointly owned) that are material in the context of the overall business operations or the financial results of the entity and its subsidiaries (on a consolidated basis).

The ASX and other mineral reporting codes do not define what is meant by the term 'material'. To help determine whether or not a mining project is 'material', one could refer to the materiality guidelines in the Australian Accounting Standard (defined in AASB, 2015, and Spencer, 2014):

Material Omissions or misstatements of items are material if they could, individually or collectively, influence the economic decisions that users make on the basis of the financial statements ...

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and ... the critical decision to be made regarding materiality is whether leaving out information would result in the financial statements being misleading.

As a rule of thumb, many in the industry interpret a matter to be material if, when reported or not reported, the information may result in a ten per cent or greater impact on the valuation of an entity. Clearly, for a small company with only one major project, this may mean a ten per cent or greater change in the estimated value for that one project. However, for a major company with many projects, such a significant change in only one project may not be material to the value of the company as a whole.

The ASX Chapter 5 Listing Rules have adopted the definitions for Exploration Results, Mineral Resources and Ore Reserves from the JORC Code.

The listing rules further provide for the reporting of Historic and Foreign Estimates for mineralisation for material mining projects and the requirements applicable to the reporting of Production Targets. Neither of these categories are defined or used in the JORC Code or the VALMIN Code.

To provide transparent disclosure to stakeholders, the ASX Listing Rules 5.10 to 5.14 (ASX, 2014) require that when publicly reporting Historic Estimates or Foreign Estimates of mineralisation for the first time, the entity must provide supporting information on the following:

- source and date of the estimates
- an explanation of the differences in the reporting categories relative to the JORC Code
- relevance and materiality of the estimates to the entity
- the reliability of the estimates, including a reference to any relevant criteria from the JORC Code Table 1
- where possible, a summary of the work programs supporting the estimates and a summary of key assumptions, parameters and methods used to prepare the estimates
- details of any more recent estimates or relevant data available
- the evaluation and/or exploration required to verify the estimates to the JORC Code standards
- the proposed timing of the proposed evaluation or exploration works and how this will be funded
- a cautionary statement, proximate to and of equal prominence as, the reported estimates
- a Competent Person statement confirming the accurate representation of the available information on the estimate.

Production targets

The ASX Listing Rules 5.15 to 5.19 (ASX, 2014) define a Production Target as:

... a projection or forecast of the amount of minerals to be extracted from a tenement(s) for a period extending past the current year and the forthcoming year.

This term is not defined in the JORC Code or the VALMIN Code. Any reference to production forecasts and mining schedules in the JORC Code would be expected to be derived from the definition and reporting of Ore Reserves.

Unlike a production forecast based on an Ore Reserve, the Production Target under the listing rule may also be defined, but not solely, on a combination of an Exploration Target and Inferred Resource and/or Historical/Foreign Estimate, or various categories of Mineral Resources. Any reporting of a Production Target must include a Competent Person's statement; all the material assumptions; and the proportions of Proved and Probable Ore Reserve, Measured, Indicated and Inferred Mineral Resource, Exploration Target or Historical/Foreign Estimate included in the target. The Production Target must also be accompanied by a

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cautionary statement proximate to the reported target and equally prominent if based on an Inferred Resource or partly on an Exploration Target. If based solely on an Inferred Resource, the entity must also disclose the factors providing a reasonable basis for the reporting, the level of confidence in the estimate and basis and a technical report to support the Production Target.

In the case of a Production Target relying entirely on an Inferred Resource, the cautionary statement must read:

There is a low level of geological confidence associated with inferred mineral resources and there is no certainty that further exploration work will result in the determination of indicated mineral resources or that the Production Target itself will be realised. (ASX, 2014)

Where the Production Target relies on a portion of an Exploration Target, the cautionary statement must read:

... the potential quantity and grade of an exploration target is conceptual in nature, there has been insufficient exploration to determine a mineral resource and there is no certainty that further exploration work will result in the determination of mineral resources or that the Production Target itself will be realised. (ASX, 2014)

It is clear from the cautionary statements that stakeholders should not read more confidence into a Production Target than the underlying information supports, and those reporting Production Targets or financial outcomes derived from Production Targets are advised to seek expert advice to ensure that they meet the requirements and intent of the ASX Listing Rules.

A Combined Resource Project Framework

The inter-relationship of increasing certainty and project value, with advancing development stages, Mineral Resource and Ore Reserve reporting and the level of technical study, is often illustrated by way of a schematic similar to that in Figure 2 (Noppé, 2014).

While Figure 2 provides a useful diagram to illustrate the typical stage of development of a project, the author believes a more transparent way to present a project using the definitions and guidelines of the various reporting codes (JORC Code, ASX Chapter 5 Listing Rules, VALMIN Code) is in a table such as Figure 3. The Resource Project Framework in the table makes use of three main axes to align the reporting intentions and expectations of the various codes. The vertical axis represents the increase in relative accuracy of the tonnage and grade/quality estimates of the Exploration Target, Production Target and Resource and/or Reserve as defined by the JORC Code and/or ASX Chapter 5 Listing Rules. The horizontal axis at the top of the table represents the project development stages as defined by the VALMIN Code, and these are aligned along the bottom axis with the level or rigour of technical-economic assessment expected to support the reported material quantities and economic outcomes at a particular project development reporting stage.

The Resource Project Framework (Figure 3) provides a matrix of different reporting measures to cross-check the context of a project's reported results. For example, an Ore Reserve must be supported by a technical and economic assessment of the project at the level of at least a Pre-Feasibility Study. In addition, an Ore Reserve includes a technically achievable and economically viable mine plan and schedule supporting its production forecast. Therefore, a stakeholder should be concerned if a company reports an Ore Reserve or production schedule but has not completed a Pre-Feasibility level of study. If this occurs, the stakeholder should consider whether the 'Ore Reserve' is rather an aspirational or conceptual Production Target as defined by the ASX Listing Rules (ASX, 2014).

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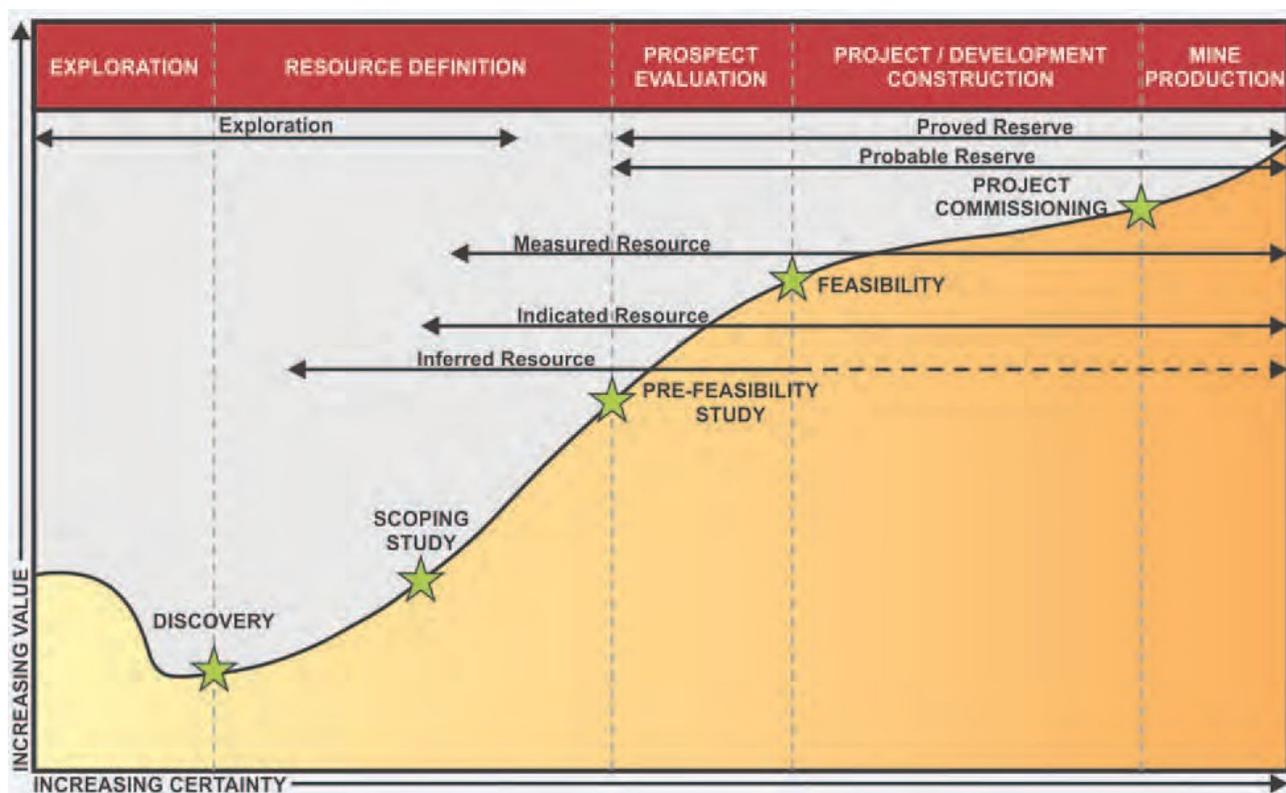


FIG 2 – The inter-relationship of increasing certainty and project value with advancing development stages and the level of technical study (Noppé, 2014).

Similarly, the stakeholder should question the reporting if a company reports the completion of a Pre-Feasibility Study, but does not expressly report an Ore Reserve.

Another way for a stakeholder to interpret the resource project reporting stages in Figure 3 is to consider whether the company's project reporting may be considered as 'aspirational', 'conceptual' or 'data driven'. These are not terms found in the main reporting codes, but they are useful when considering the likelihood of a project advancing to the stage where the company's project forecasts become more accurate.

In the author's opinion, 'aspirational' project statements are generally those that articulate a company's desire, wish, want or need to achieve the stated outcome based on early to advanced Exploration Results, but with insufficient data to support a Scoping Study or the reporting of Mineral Resources. Any project forecasts derived from early Exploration Results, mineralisation delineation at the level of an Exploration Target or the reliance on Historical/Foreign Estimates may be thought of as 'aspirational'. In the case of Exploration Targets, the JORC Code notes that:

... the potential quantity and grade is conceptual in nature, that there has been insufficient exploration to estimate a Mineral Resource and that it is uncertain if further exploration will result in the estimation of a Mineral Resource. (JORC, 2012)

In the case of Historical or Foreign estimates, the ASX Listing Rules note that a Competent Person has not done sufficient work and 'it is uncertain that following evaluation and/or further exploration work that the...estimates will be able to be reported' and classified in the future as Mineral Resources or Ore Reserves (ASX, 2014).

The author considers 'conceptual' project development statements as those generally based on Scoping or Conceptual studies, with an expected study accuracy range from -20 to -50 per cent on the low side to

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+30 to +100 per cent on the high side (AACE International, 2012). As such, these studies are typically based predominantly on Inferred Resources, although, even if higher classes of Mineral Resources are defined, the study is not carried out to any better accuracy than a Scoping Study level. As defined by the JORC Code, all categories of Mineral Resources must satisfy the requirement that there are reasonable prospects for eventual economic extraction, regardless of the classification of the Resource. The JORC Code provides further guidance that:

The term 'reasonable prospects for eventual economic extraction' implies an assessment (albeit preliminary) by the Competent Person in respect of all matters likely to influence the prospect of economic extraction including the approximate mining parameters. It is a realistic inventory of mineralisation which, under assumed and justifiable technical, economic and development conditions, might, in whole or in part, become economically extractable. (JORC, 2012)

Project outcomes that are better informed by both technical data and technically and economically rigorous studies are considered by the author to be highly 'data driven'. The Resource Project Framework from Figure 3 has been marked up in Figure 4 to illustrate the areas where the reported project development statements may be considered as 'aspirational', 'conceptual' or 'data driven'.

Example Case Studies

Example 1

A company originally reported the technical and financial outcomes of a 'Definitive Feasibility Study', including production rates, net present value, capital and operating cost estimates. The project outcomes were questioned by the ASX, following which the company downgraded the level of study to a 'Feasibility Study', but one for which no Ore Reserves were reported and where it was acknowledged that the Mineral Resources were still to be updated before the study could be completed and Ore Reserves actually defined and reported.

In other words, the company's original public statement reporting a Definitive Feasibility Study supporting a project net present value of over A\$2 billion was misleading, and, in effect, the original and revised company statement seem more correctly to represent the results of a Scoping Study carried out on a preliminary Mineral Resource estimate. This context would have been perfectly clear if the original announcement had used the JORC Code terminology and classifications correctly and also contained a proximal cautionary statement to the effect:

The Scoping Study referred to in this report is based on low-level technical and economic assessments, and is insufficient to support estimation of Ore Reserves or to provide assurance of an economic development case at this stage, or to provide certainty that the conclusions of the Scoping Study will be realised. (JORC, 2012).

The relative development stage and context of the project, as originally reported and then more correctly reported, is illustrated in the Resource Project Framework in Figure 5.

Example 2

In the second example, a company looking to attract a co-investor for the acquisition of a base metal project prepared an information memorandum for the potential investors. The information memorandum compared the project to the nickel-copper Nova Project owned by Sirius Resources. At the time that the information memorandum was circulated, Sirius Resources had completed a Feasibility Study on the Nova Project, attracted development funding and had a market capitalisation of close to A\$1 billion. The information memorandum included a Scoping Study document of a few hundred pages in length describing the deposit drill data, grade and tonnage modelling and estimates, upside potential in planned drilling targets and a processing plant study.

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RELATIVE CONFIDENCE MATRIX								
Project Development Stage (VALMIN, 2005)								
		Exploration Areas	Advanced Exploration	Prospect Evaluation			Development	Operating
				Resource Definition	Preliminary Development Options	Final Development Option		
Confidence in Quantity and Grade Quality (JORC Code, ASX)	Reconciliation							
	Ore Reserves							
	Production Target on Measured + Indicated (ASX)							
	Measured and Indicated Resources							
	Production Target on Inferred (ASX)							
	Inferred Resources							
	Foreign / Historical Estimate (ASX)							
	Exploration Target							
	Exploration Results							
	Early Exploration							
		Exploration (pre-discovery)	Mineralisation Delineation (post-discovery)	Approximate Mining Parameters	Scoping Study	Pre-Feasibility Study	Feasibility Study	Final Engineering
Level of Technical-Economic Study Accuracy (JORC Code, Industry Expectations)								

*Dark grey matrix cells are considered Material in the context of the project being reported
 *Dark green matrix cells are the expected and typically JORC Code, VALMIN Code and ASX compliant reporting outputs for all three axes

FIG 3 – A Resource Project Framework for reporting a resource project in context.

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		RELATIVE CONFIDENCE MATRIX								
		Project Development Stage (VALMIN, 2005)								
		Exploration Areas	Advanced Exploration	Prospect Evaluation			Development	Operating		
				Resource Definition		Preliminary Development Options			Final Development Option	
Confidence in Quantity and Grade Quality (JORC Code, ASX)	Reconciliation									
	Ore Reserves									
	Production Target on Measured + Indicated (ASX)									
	Measured and Indicated Resources									
	Production Target on Inferred (ASX)									
	Inferred Resources									
	Foreign / Historical Estimate (ASX)									
	Exploration Target									
	Exploration Results									
	Early Exploration									
		Exploration (pre-discovery)	Mineralisation Delineation (post-discovery)	Approximate Mining Parameters	Scoping Study	Pre-Feasibility Study	Feasibility Study	Final Engineering	Operating	
Level of Technical-Economic Study Accuracy (JORC Code, Industry Expectations)										

¹ Dark grey matrix cells are considered Material in the context of the project being reported
² Dark green matrix cells are the expected and typically JORC Code, VALMIN Code and ASX compliant reporting outputs for all three axes

FIG 5 – Resource Project Framework, illustrating the relative context for Example 1.

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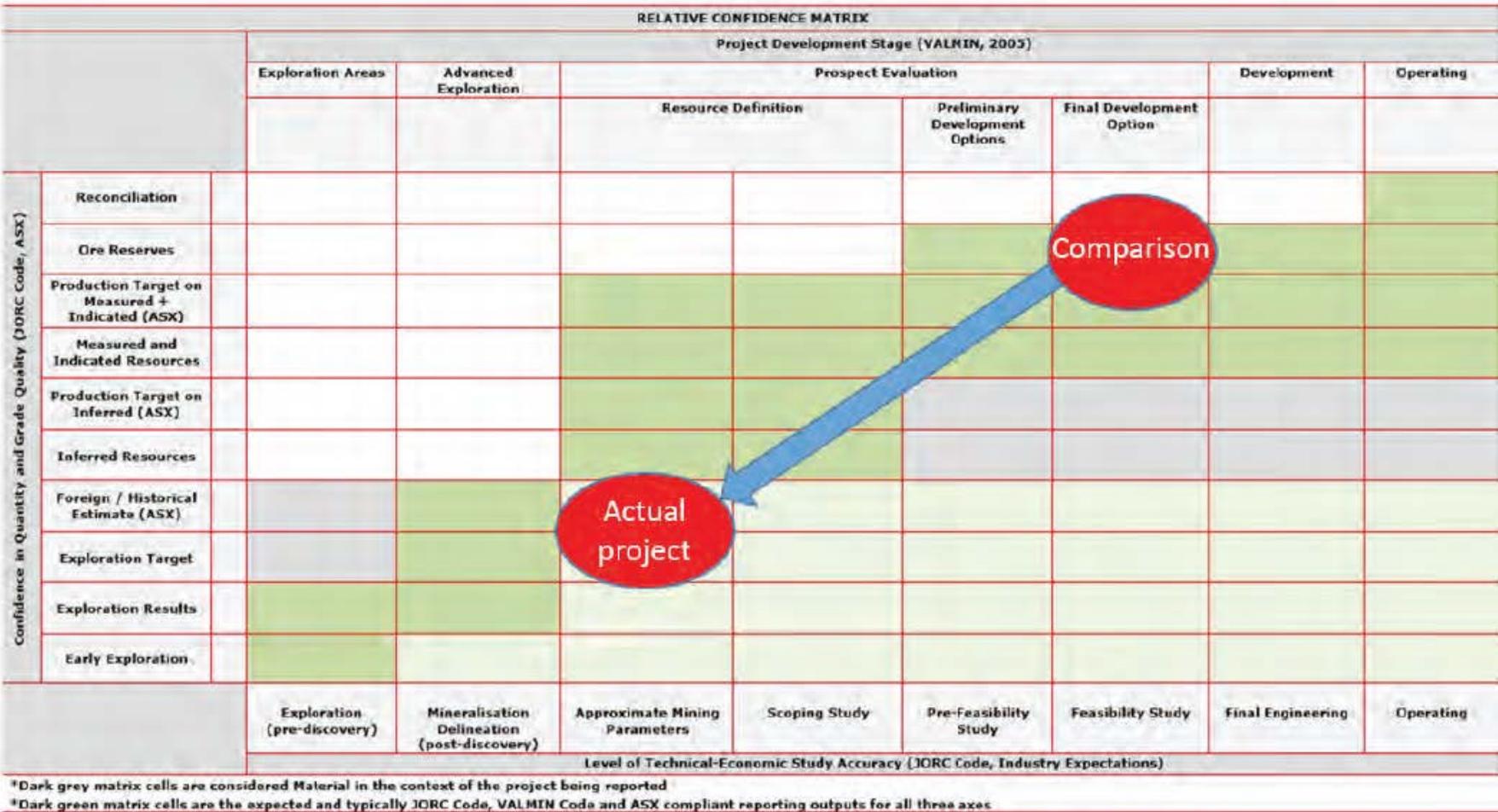


FIG 6 – Resource Project Framework, illustrating the relative context for Example 2.

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Conclusions

Investors have access to an array of public information on resource projects released by the projects' various proponents. Unfortunately, there can be an inconsistent use of reporting definitions supporting the information on project assumptions and outcomes, and this inconsistency may confuse those relying on the reported information and/or lead to incorrect assumptions and confidence in a project's value. Investors and other stakeholders assessing the risk, opportunity, relative confidence and even value associated with a resource project therefore need to appreciate the project's attributes in the correct context.

This paper presents a simple tool to gauge how the reported information aligns with the claimed level of project development and evaluation. The Resource Project Framework uses terms and definitions from public reporting codes and company listing rules to allow a balanced assessment of a project's reported technical and financial status. When applying the framework, the assessor may wish to assign ratings to the criteria on the three axes to provide an overall relative ranking score for the various project stages that plot in the table. Considering the project reporting in this context readily allows cross-checking and benchmarking of project development and reporting confidence. The correct use of this framework has been demonstrated to be effective in identifying potentially misleading resource project information and subsequently protecting against making biased assumptions on project status and value.

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