BREAKOUT SESSION

SUBSURFACE RISK AND UNCERTAINTY WORKSHOP
MANAGING RISKS ACROSS THE MINING AND OIL & GAS LIFECYCLE CONFERENCE
10 – 12 JULY 2017

The following are the outputs of the Breakout Session from the three groups participating in the Subsurface Risk and Uncertainty Workshop. The workshop was predominantly attended by Oil & Gas professionals, joined by 4 colleagues from the mining sector. Three themes were explored:
1. Define Risk and Uncertainty
2. Identify subsurface risks and uncertainties contributing to underperformance in both Mining and Oil & Gas Industries
3. Identify best practice and recommended actions to improve performance

GROUP 1
1. Definitions
   a. Risk = Discrete deviation from an objective event/threshold
   b. Uncertainty = Lack of full knowledge to determine the exact value of the event/parameter
2. Underperformance Themes
   a. Over optimistic base case (i.e., too high)
   b. Overconfidence (i.e., uncertainty range too narrow)
   c. Alternative not fully identified
   d. Poor understanding of risk and volumetric input parameter dependencies
   e. Interpretation bias (e.g., anchoring, confirmation, motivational)
   f. Personality styles (e.g., "Go Getters")
   g. Company Risk Profile
   h. Management – Technical Interface
3. Mitigations and Recommendations
   a. Mechanism to learn from past performances (e.g., "Look-Backs", compare with analogues)
   b. Capture, record and analyse
   c. Decision Analysis and Risking Master Courses
   d. Consistency on quantification of the risk (i.e., Chance of Success)
   e. Bias training course
   f. Decision Quality with emphasis on people, system, and process – making good decisions rather than just making a decision
   g. Improve implementation of recommendations from 'Top-to-Bottom'
   h. Value of Information post-studies
   i. Say "NO!" to management timing schedule
   j. Project Planning

GROUP 2
1. Definitions
   a. Risk = Perception of loss
      i. Belief, Probability, Frequency
      ii. Context
      iii. Definition of loss
   b. Uncertainty = Range of possible outcomes
      i. The range of success possibilities
      ii. Curve vs. binary

2. Underperformance Themes
    a. Technical
        i. Over-optimistic
        ii. Poor understanding of probabilities
        iii. Poor understanding of key factors
        iv. Insufficient geologic scenarios
    b. Behavioural
        i. Cognitive biases (e.g., anchoring, confirmation, overconfidence, motivational)
3. Mitigations and Recommendations
    a. Plan – Do – Review – Update
    b. Integrated view of opportunity through lifecycle
    c. Discussion of 'post-discovery' upfront
    d. Mitigate bad behaviours (e.g., closed-minded, overconfident) with training and leadership
    e. Use metadata (data vs. knowledge)
    f. Open-minded to new idea, develop way to move them forward
    g. Look at other industries (i.e., cross-pollination)
    h. Try new things, be creative
    i. Make efficient decisions
    j. Avoid spending too much time on marginal opportunities
    k. Align risks and uncertainties
    l. Ensure technical staff are not disconnected from the corporate structure and process
    m. Do not over-engineer volumes prior to development; be aware of economic cutoffs
    n. Self-critical, open-minded and curious attitude

GROUP 3
1. Definitions
    a. Risk = Probability that forecast outcomes will fall below a specified threshold (e.g., technical, economic, commercial)
    b. Uncertainty = Range of outcomes within which the specified parameter will fall (e.g., recoverable resource, tonnage of metal)
2. Underperformance Themes
    a. Overestimation of success
    b. Volumetric overestimation related to bias and technical issues
    c. Want to find big prospects
    d. Competing for funds
    e. Single deterministic estimate (Mining)
3. Mitigations and Recommendations
    a. Performance Tracking
    b. Play calibration
    c. Improved quantification
    d. Information access, sharing and collaboration
    e. Corporate culture
        i. Review and Process
        ii. Hurdles
        iii. Resistance to downward revision of estimates
    f. Investor education
    g. Portfolio approach
    h. Address early "booking" of reserves (Mining)
    i. Quantify risk and uncertainty
    j. Diversification

Session Chairs Observations

Surprisingly, there were not consistent definitions of risk and uncertainty between the workshop participants and within each industry. The consensus appears to be that risk refers to an anticipated outcome or event not happening (which would result in a "loss"); and uncertainty relates to the range of outcomes one might expect in the success case.

The Oil & Gas Industry appears to have embraced probabilistic assessments of resources; whereas the Mining Industry undertakes more deterministic assessments. Decision processes and workflows used in the Oil & Gas industry are very effective due to a numerically well understood and analysed degree of uncertainty. Handling technical uncertainty in the mining industry is different as the same rigorously applied analytical assessments appear to not work in an environment with a generally higher degree of uncertainty.

Whilst in the oil and gas sector decisions about single, but expensive, wells need to be made, it is commonly accepted that in the mining exploration sector a dozen cheaper, if not hundred or more (e.g. Oyu Tolgoi, Mongolia), holes need to be drilled to make a discovery that leads to the definition of an economic resource. There was a sense that Unconventional Resource exploitation in the Oil & Gas Industry may be similar to Mining, with the similar practices and assessments applied.

Cognitive Bias and other poor behaviours are believed to be a significant issues and contributor to not achieving predicted performance, and hence eroding value. Training and awareness were suggested mitigations.

There was a strong desire for both sectors to learn from each other to improve performance and achieve best practice.

Marc Bond   Benedikt Steiner
marcbond@roseassoc.com   benedikt@xplore.global