Technical and Behavioral Biases in Exploration: Examples from the Middle East

Abdulkader Afifi[1]

[1]KAUST

Abstract

After ~90 years of exploration and production, companies in the Middle East has been successful in adding substantial oil and non-associated gas reserves. This success was due to sustained investment in exploration for conventional and unconventional plays, driven by a measured dose of optimism. This success would not be achievable without investment in geoscience training, and rapid adoption of effective technologies such as large 3D seismic surveys and horizontal wells. The Petroleum industry's anticipation of new realities is evident from their support for research on carbon sequestration in sedimentary aquifers, carbon mineralization in mafic / ultramafic rocks, and natural hydrogen plays. In contrast, the growth of the mining industry has been limited by weak exploration effort during the past three decades, dwindling portfolios, weak training, and organizational factors.

This talk illustrates several technical and behavioral biases in exploration using examples from the Middle East.

On the technical side, the inheritance bias assumes reactivation of large geologic structures, such as basement terrane boundaries and faults. The analogue bias assumes that the geology of one area is similar to another, such as the assumed similarity between the Red Sea basin and the Gulf of Suez. Lastly, the desktop computing environment may cause distorted perceptions of rock structures, properties, and fluid flow. On the behavioral side, the conformance bias leads to Groupthink and the slow acceptance of new concepts. The optimism bias causes overestimation of undiscovered resources or underestimation of exploration risks. The distrust bias impedes sharing of exploration data and concepts. The business as usual bias retards progress.

Awareness of these biases is needed for the energy transition towards cleaner fuels and sequestration of gigatons of carbon in the subsurface. Furthermore, lessons learned by the oil industry are needed to revive mineral exploration in the Middle East.