## Aramco Upstream Solution Technathon 2019

## Lithofacies classification based on rock image recognition using deep learning

**Problem:**

To perform better reservoir characterization, rock samples (in the form of full-size cores or drill cuttings) extracted during drilling operations are usually thoroughly analyzed in the core laboratory. One of the outcomes of this analysis is digital high-resolution photographs for these rock samples which contain indirect yet detailed information about mineralogy content and morphological parameters of the reservoir formations.

**Solution:**

Participants are expected to develop an integrated image recognition procedure to obtain accurate lithofacies classification which should be consistent with well log data clustering. Within this procedure mineralogical and morphological features of various formations have to be extracted to allow rock pattern recognition and automatically predict lithofacies consistently linked with well log features.

**Details of the challenge:**

Using the available image datasets, the participants can train their deep learning algorithms for the key geological features in rock images using classified regions from lithology logs in pdf formal. In addition, some information about grain size distribution can be used to help in identifying and classifying different lithological regions in core images. Using unsupervised machine learning algorithms, the participants also expect to perform the feature (clustering) analysis on well log data, which are represent physical measurements of rock properties along well depth. The key aim of this challenge is to link well log features to the recognized lithology regions in core images.

**Evaluation of the performance:**

The demonstration of this correlation model between well log and image recognition data has to be done on the data from Well X: the participants are asked to submit CSV/excel files (with the challenge number, the name of the team) with obtained depth regions of the linked lithological types obtained by well log and core image classification for Well X. Please send this file before Sunday, 15 December, 11am to the following address: technathon@aramcoinnovations.com

Participants are also expected to deliver a presentation with the solution approach for training on the available images, recognition of the key features from core images and well log data and identification of uncertainty for the predicted parameters.

**Data for challenge:**

* Photographs of rock samples (cores) from all wells
* Lithology logs in pdf and/or jpg for wells: 6507/7/4, 6506/12/5 and 6406/3/2
* Well logs for all wells
* Grain size information for wells: 6507/7/4, 6506/12/5 and 6406/3/2
* Lithostratigraphy table for all wells for general information