Aramco Upstream Solutions Technathon 2019

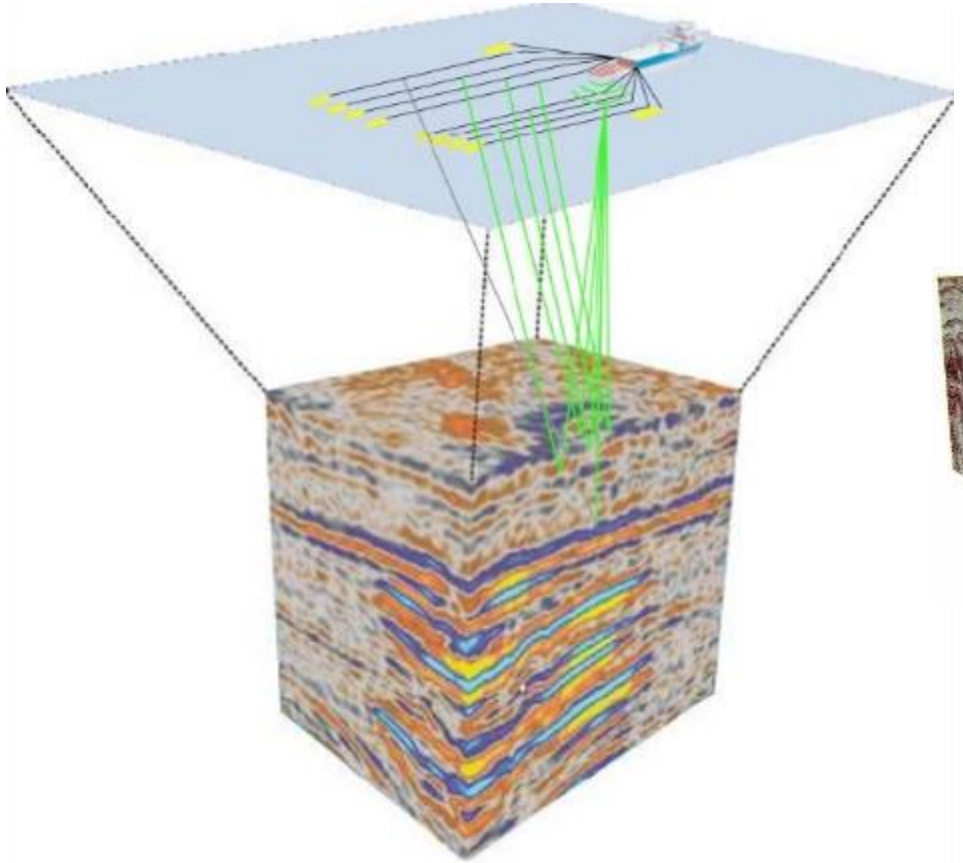
AI Challenge 1: Automated Seismic Interpretation with Uncertainty Analysis

Nasher AlBinHassan

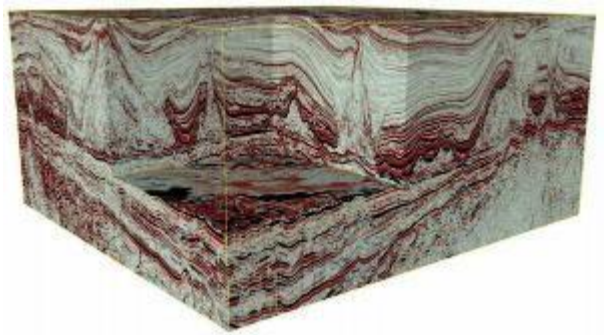
EXPEC Advance Research Center AI and Data Analytics Technology Leader

where energy is opportunity

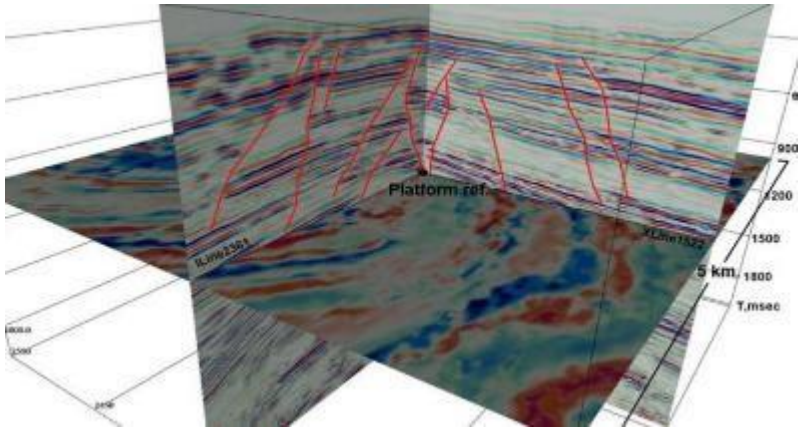
3D seismic survey
Detailed images of possible oil and gas reservoirs



Acquisition

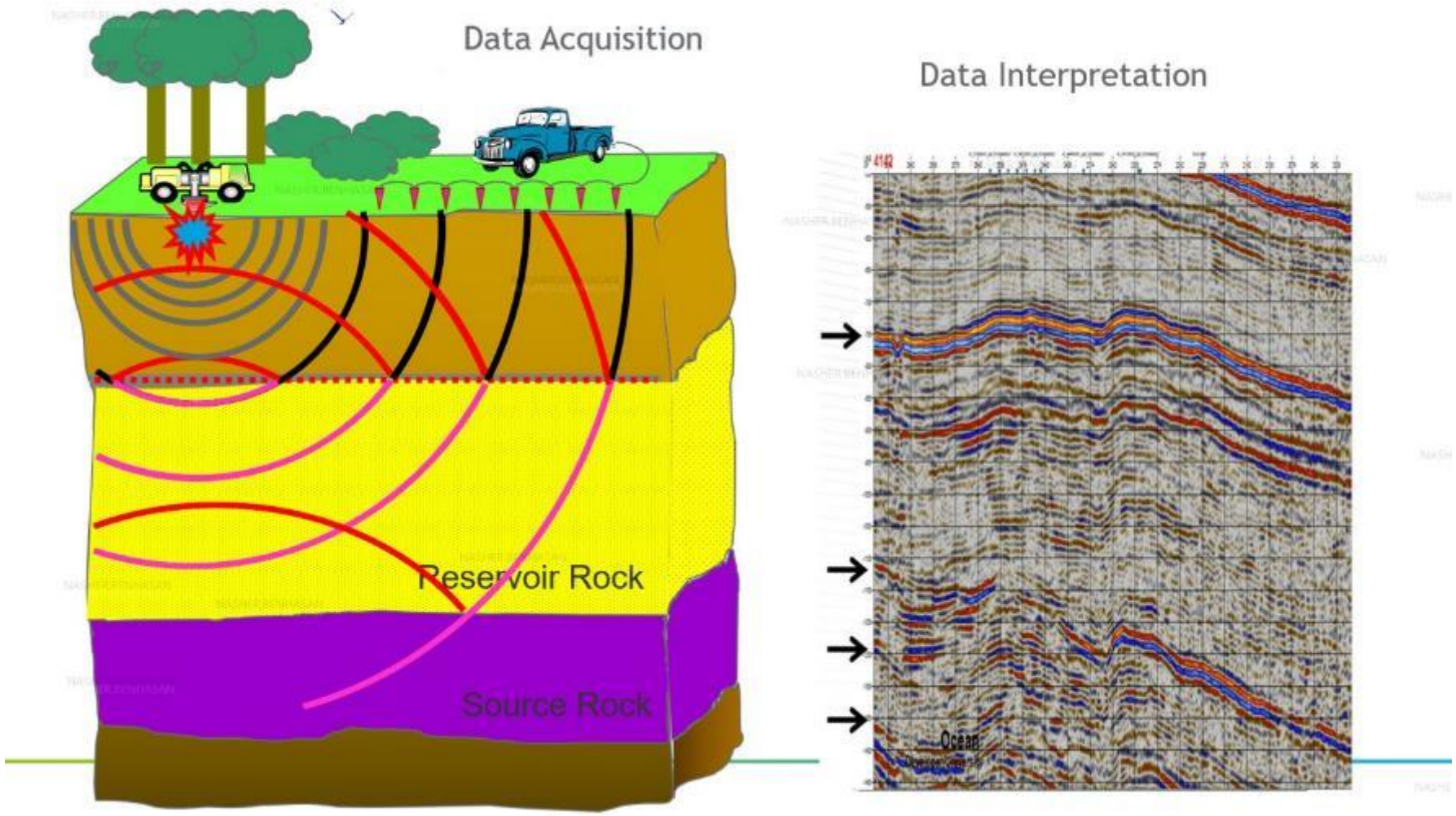


Processing

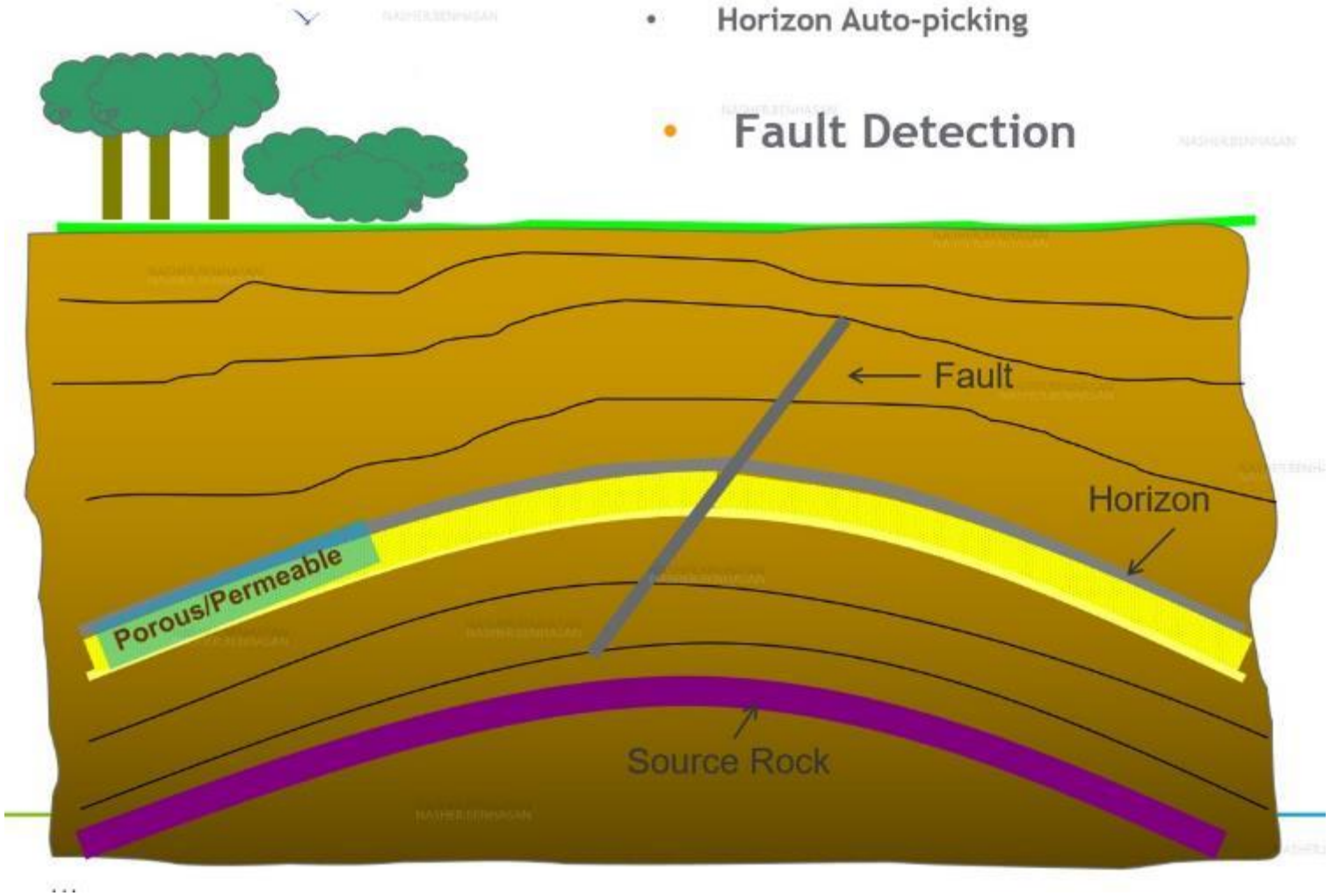


Interpretation

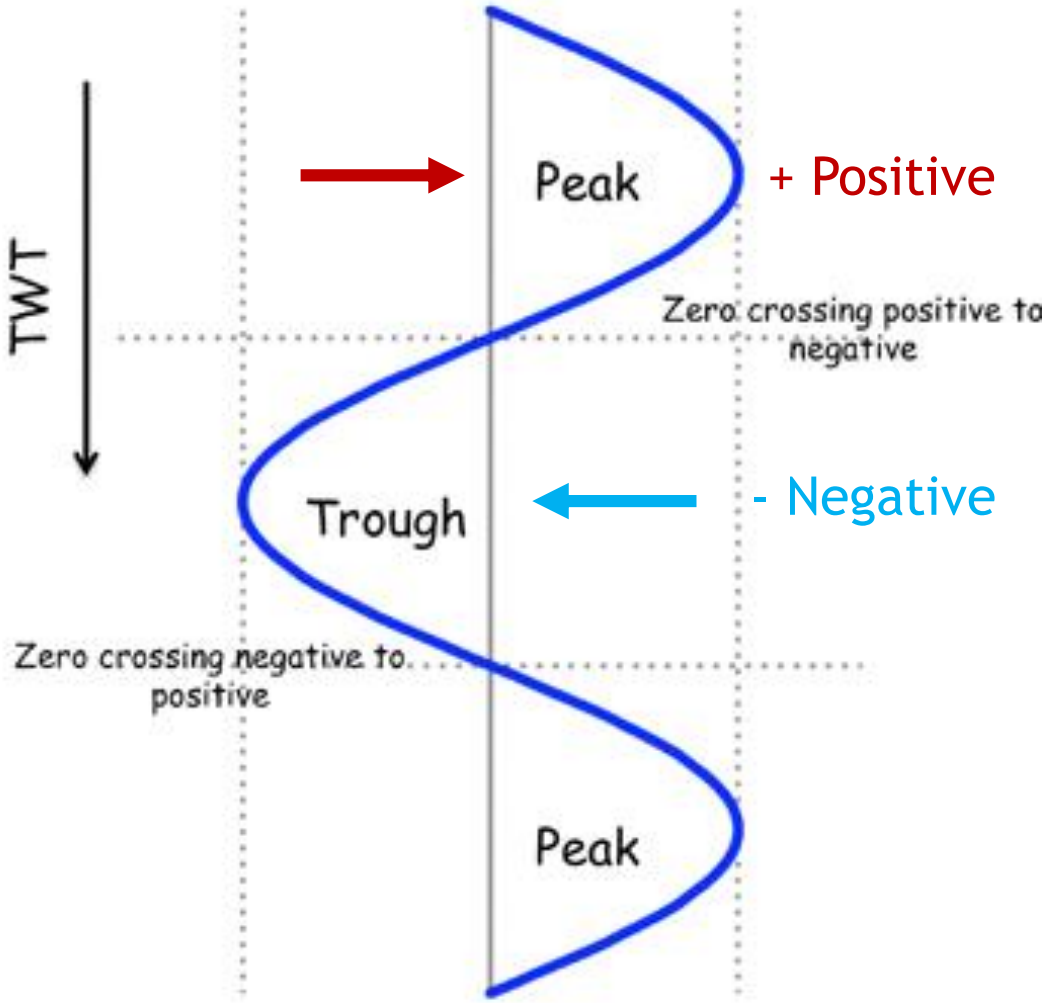
Exploration and Development



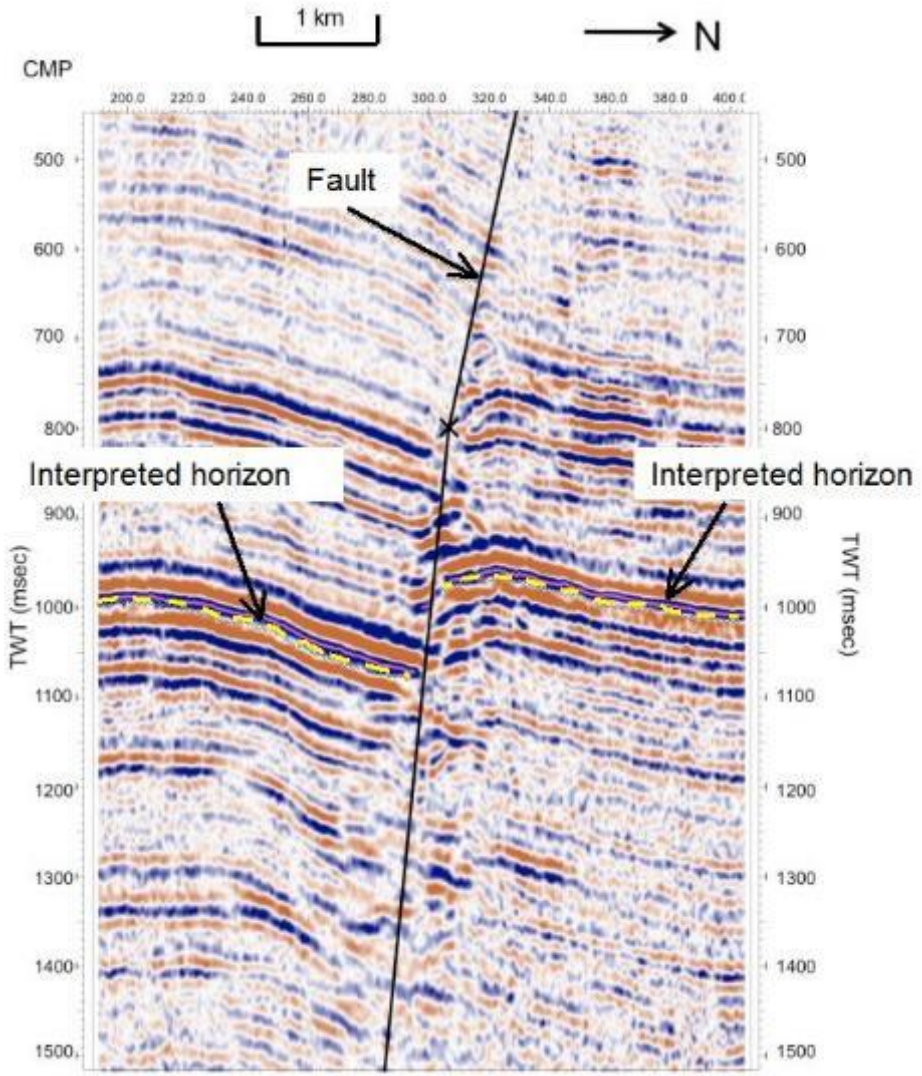
Exploration and Development



Seismic Trace

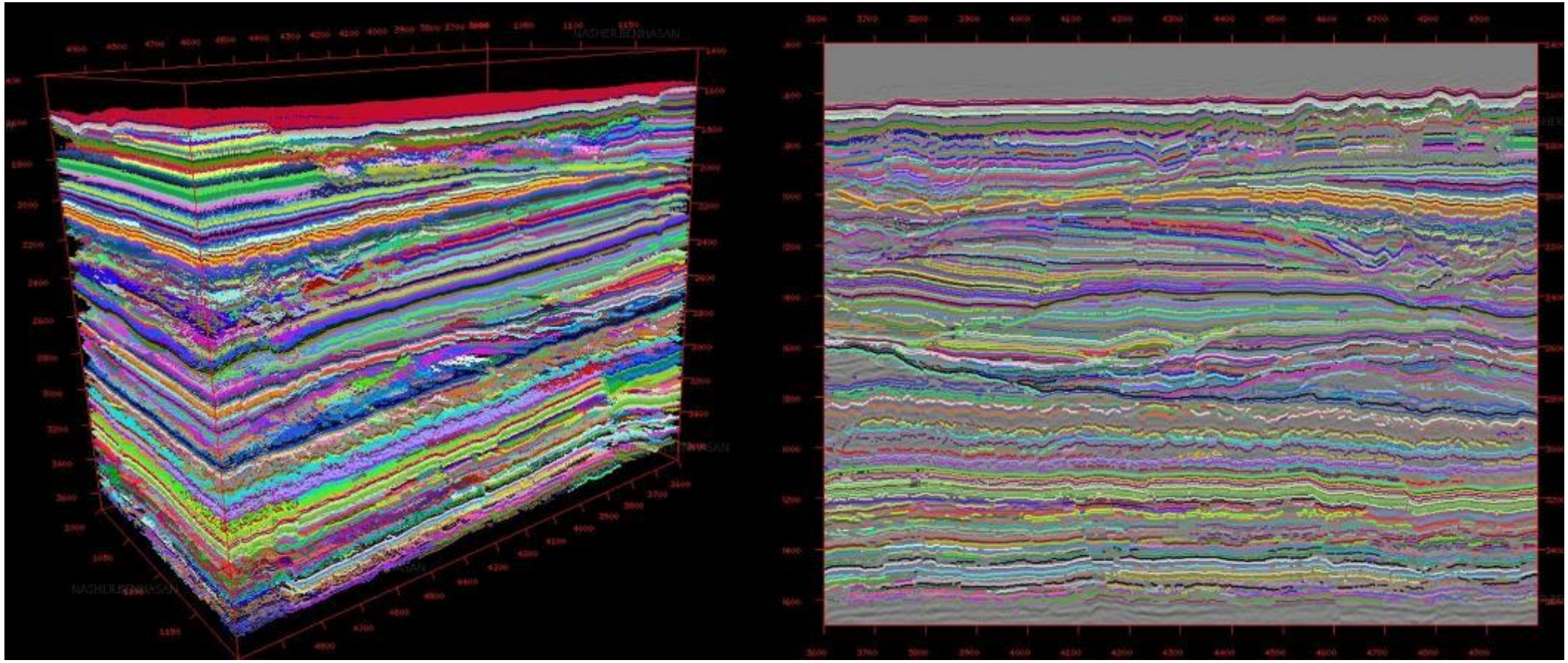


Horizons and Faults

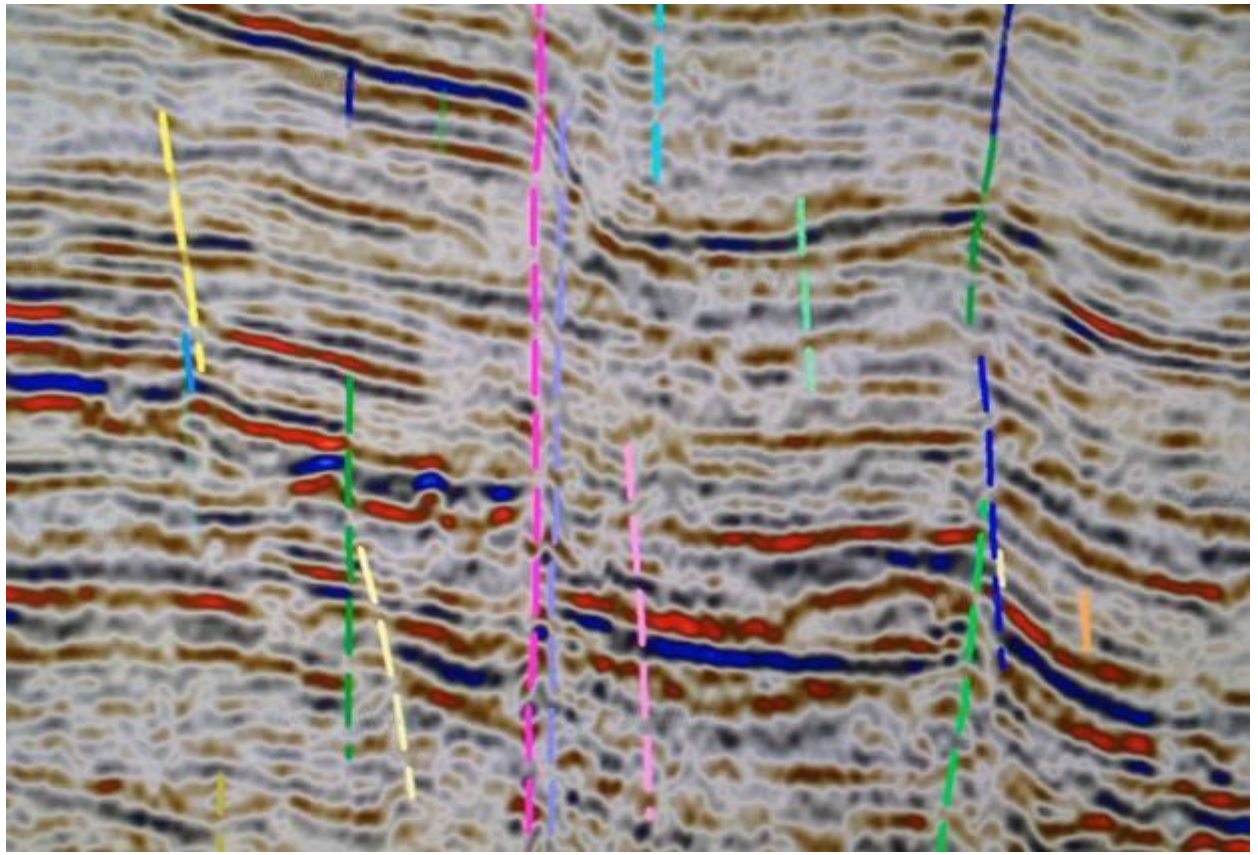


http://www.sub-surfrocks.co.uk/?page_id=260

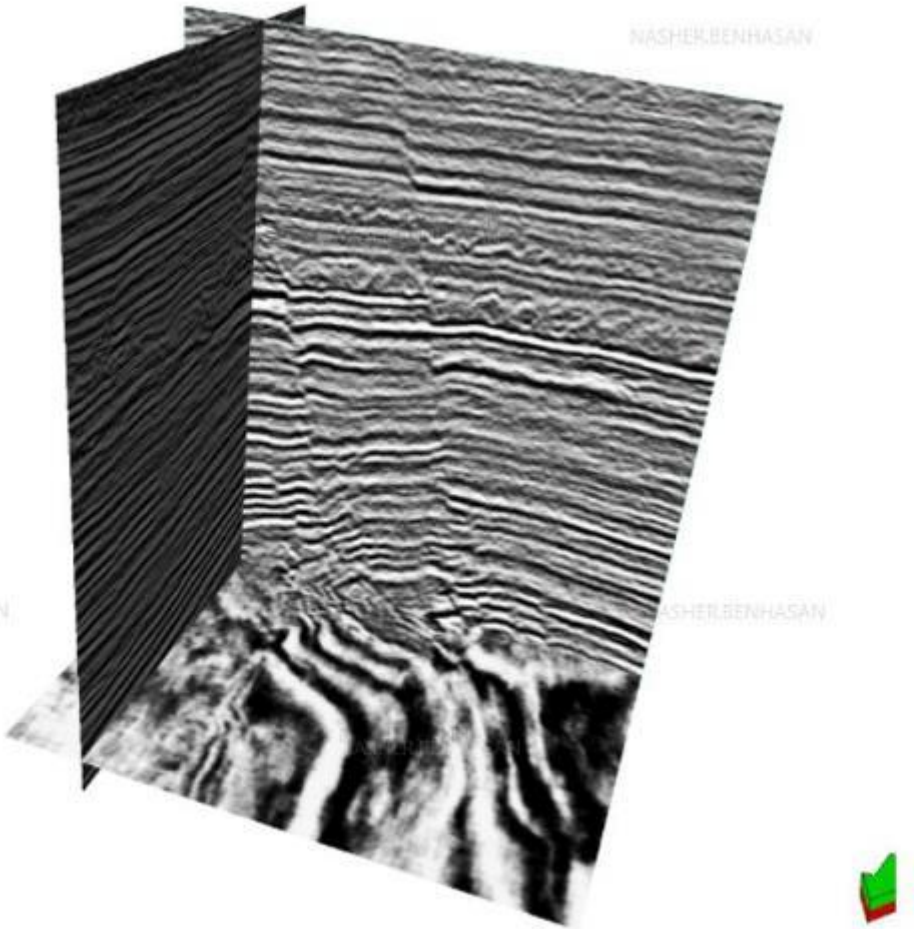
Horizons as key indicator for hydrocarbon prospects

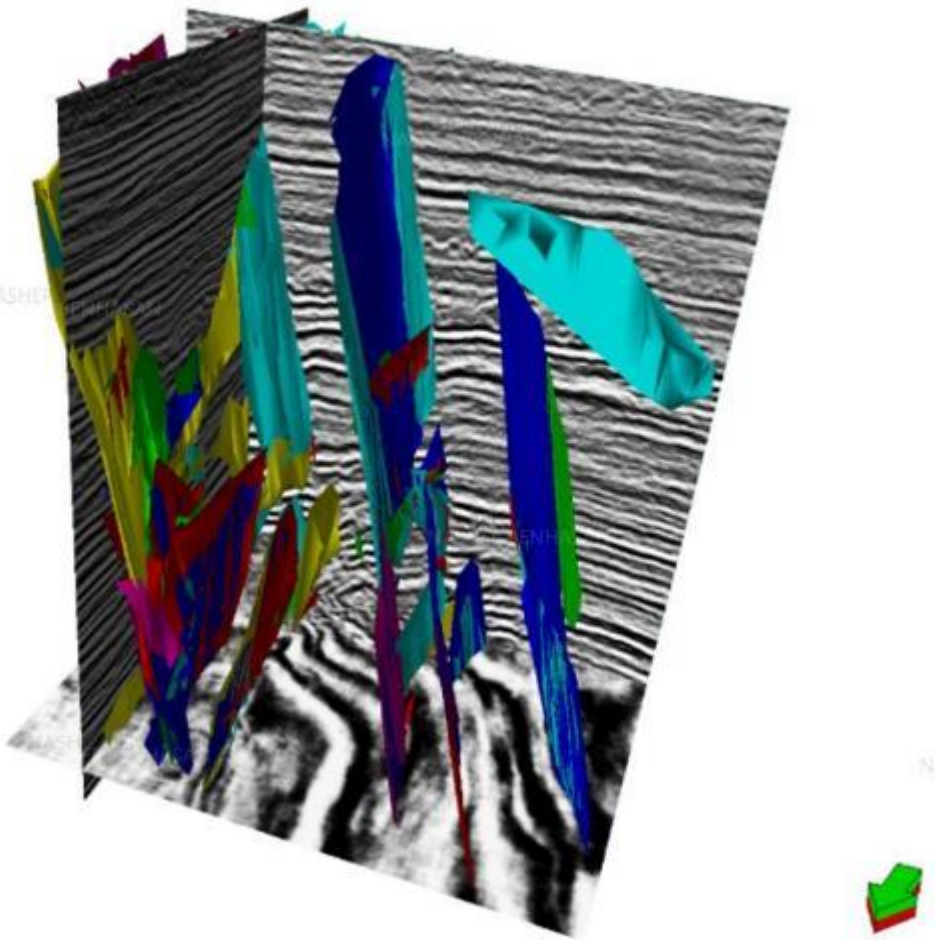


Faults as key indicator for hydrocarbon prospects



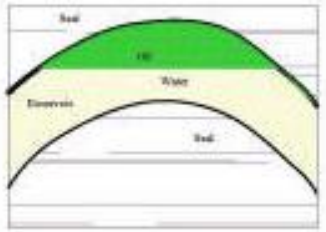
Faults as key indicator for hydrocarbon prospects



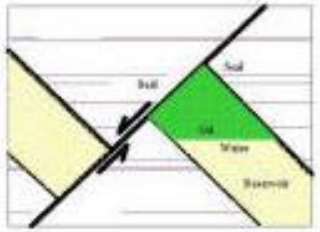


Traps as key indicator for hydrocarbon prospects

Structural Traps

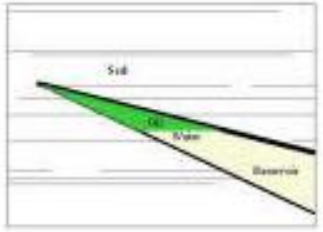


Anticline

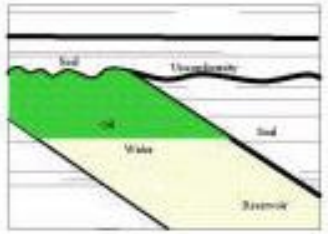


Fault

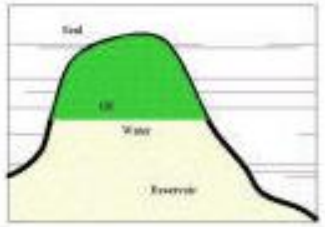
Stratigraphic Traps



Pinchout



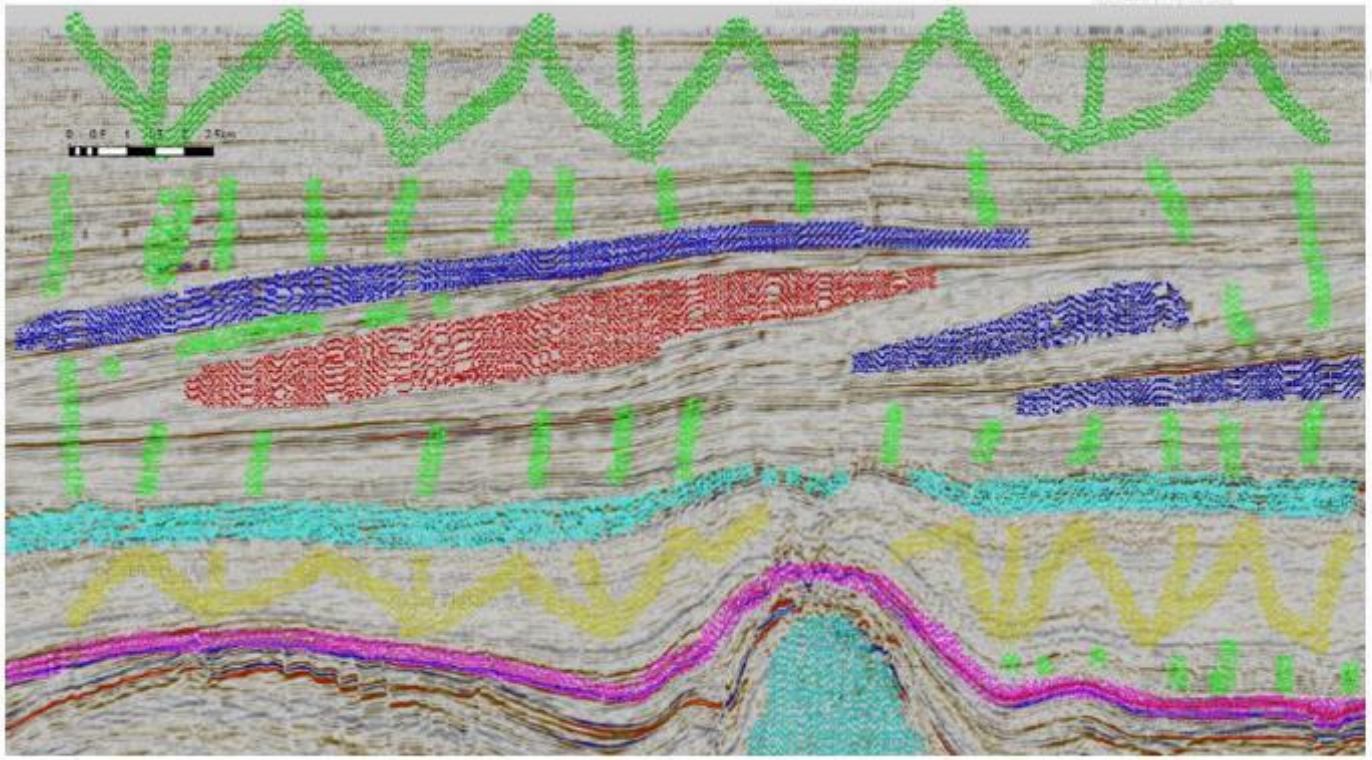
Unconformity



Reef

J F Brown 2005

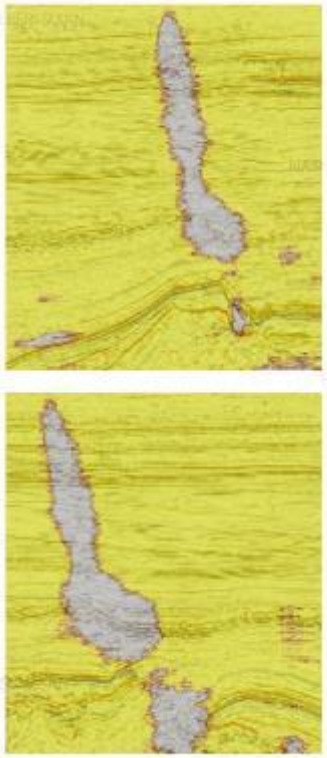
Your job is to:
Identify key indicators for hydrocarbon prospects



Faults

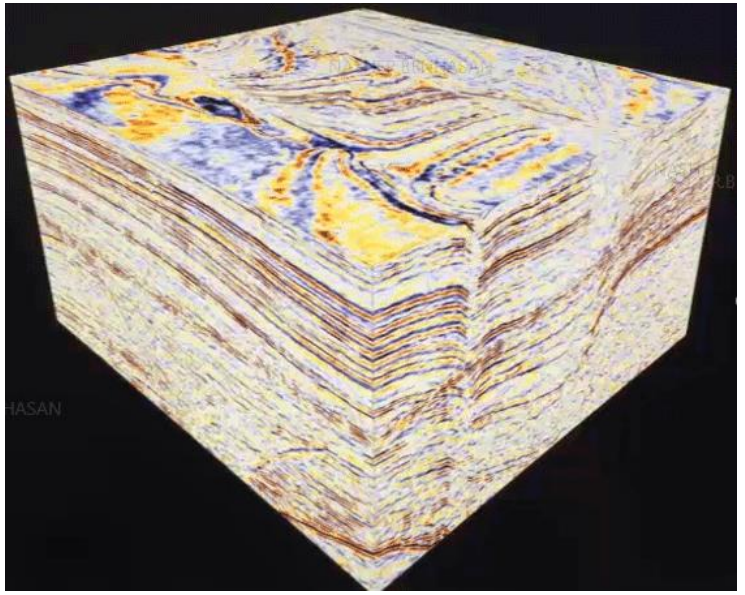
Horizons

Structural traps

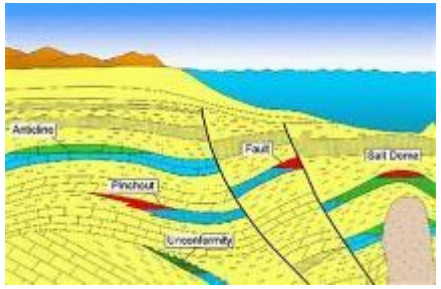


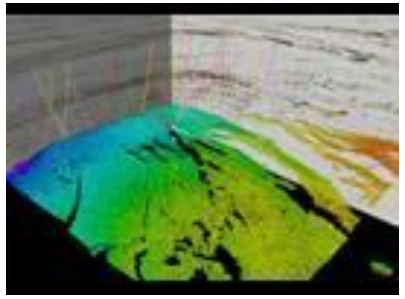
Data

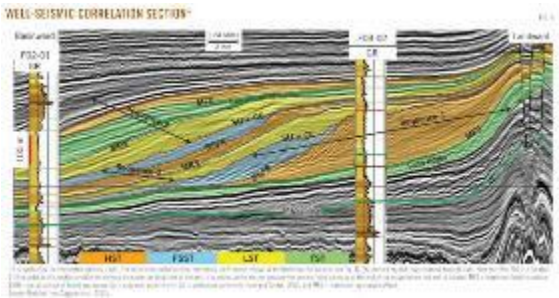
1. 3D Seismic cube dataset (Parihaka-3D)



2. Publicly available images for key structural elements, such as faults, horizons and traps







Details of the challenge

1. Build automatic seismic data interpretation algorithm that can track main horizons and faults.
2. Develop deep ML algorithms related to 3D seismic image recognition.
3. Train deep learning algorithms for the key elements of hydrocarbon play using publicly available image datasets for structural elements.
4. Estimate and visualize uncertainties for the recognition and location of the predicted elements.

Evaluation of the performance

A presentation with the solution

- Deep learning training model on available images
- 3D seismic image recognition of key structural elements
- Estimation and location identification of the predicted elements

Subject matter experts

Nasher AlBinHassan EXPEC Advanced Research center Saudi Aramco
Email: nasher.benhasan@aramco.com

Sergey Safonov Aramco Moscow Global Research Center
Email: sergey.safonov@aramcoinnovations.com

Pavel Golikov Aramco Moscow Global Research Center
Email: pavel.golikov@aramcoinnovations.com Phone: +7 906 054 2034