

Overview of general and basic petroleum geosciences

Suman Das, PhD
Explorationist, Schlumberger

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Journey from Geology to Geophysics to Geoscience

M.Tech (Applied Geology) 2001-2003
IIT Kharagpur
PhD. (Metamorphic petrology and structural geology) (2003-07)
IIT Kharagpur, India, University of Kiel, Germany



Regional Geologist (2007-2013)
(Reliance Industries Limited)



Senior Geophysicist (2013-2019)
(Schlumberger, India)



Senior Explorationist (2019-date)
(Schlumberger, Houston)



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M.sc (Geology) 1999-2001
Jadavpur University

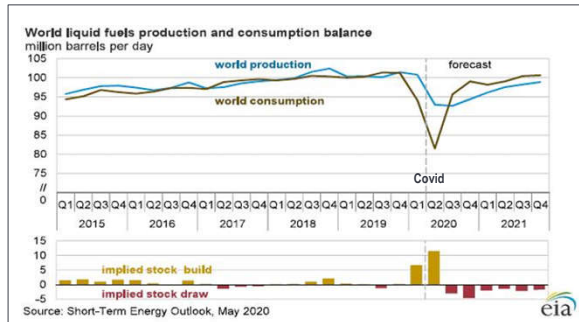


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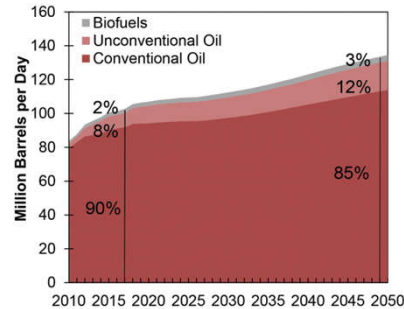
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Production vs consumption



Source: Oil and Gas Journal, May 12th, 2020

Conventional Resources are concentrations of oil or gas that occur in discrete accumulations or pools. Rock formations hosting these pools traditionally have high porosity and permeability and are found below impermeable rock formations. These impervious layers form barriers to hydrocarbon migration resulting in oil and gas being trapped below them. Conventional oil and gas pools are developed using vertical well bores and using minimal stimulation.



Source: Center for sustainable systems, University of Michigan

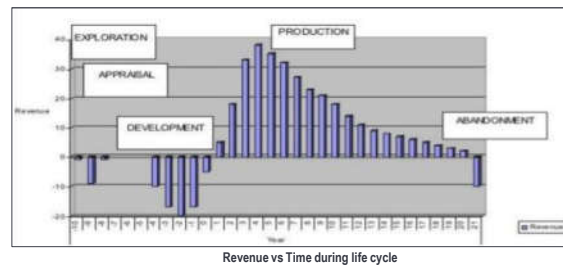
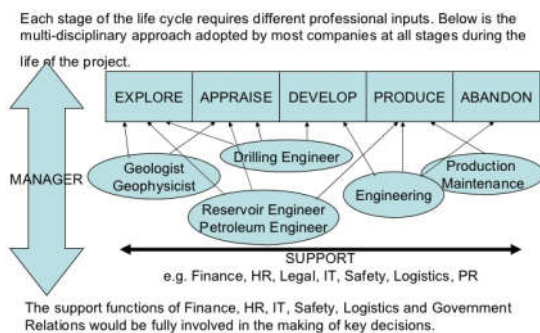
Unconventional Resources are oil or gas-bearing units where the permeability and porosity are so low that the resource cannot be extracted economically through a vertical well bore and instead requires a horizontal well bore followed by multistage hydraulic fracturing to achieve economic production.

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Technical experts involved during different life cycle



Source: www.inwellflowsol.com

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Treasure hunt





Area

A plan

Clue

Eliminate wrong path

Reaching box

Find out the magic box

Open the box to find out its treasure or water bottle

Evaluate and count

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Exploration cycle

Area

Block

A plan

Project plan

Clue





Domains

Eliminate wrong path

Risking and ranking

Reaching box

Drilling location

Find out the magic box Prospect

Open the box to find out its treasure or water bottle Appraisal and developemnt

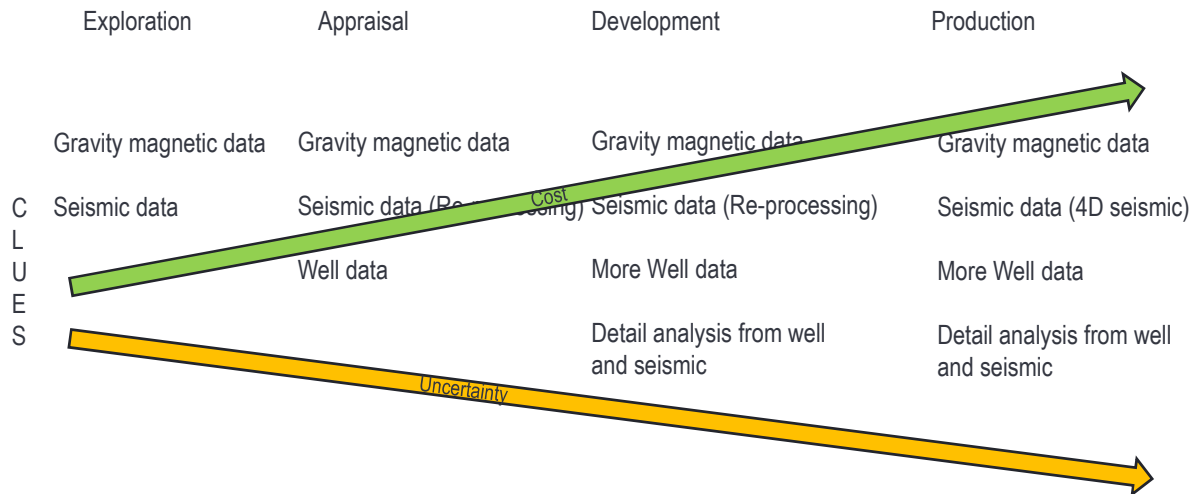
Evaluate and count Production

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The journey of hydrocarbon hunt



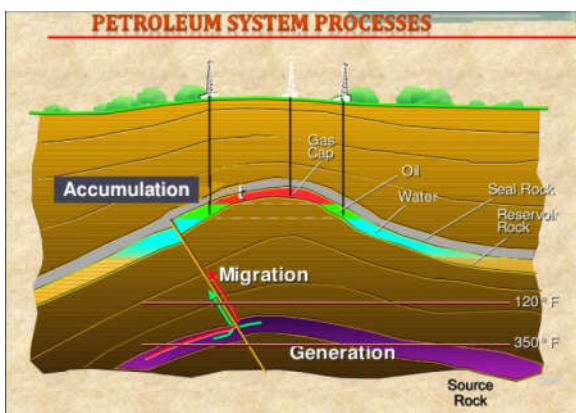
It is important to evaluate the cost with the reduction of uncertainty

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Petroleum system elements



What do we try to understand

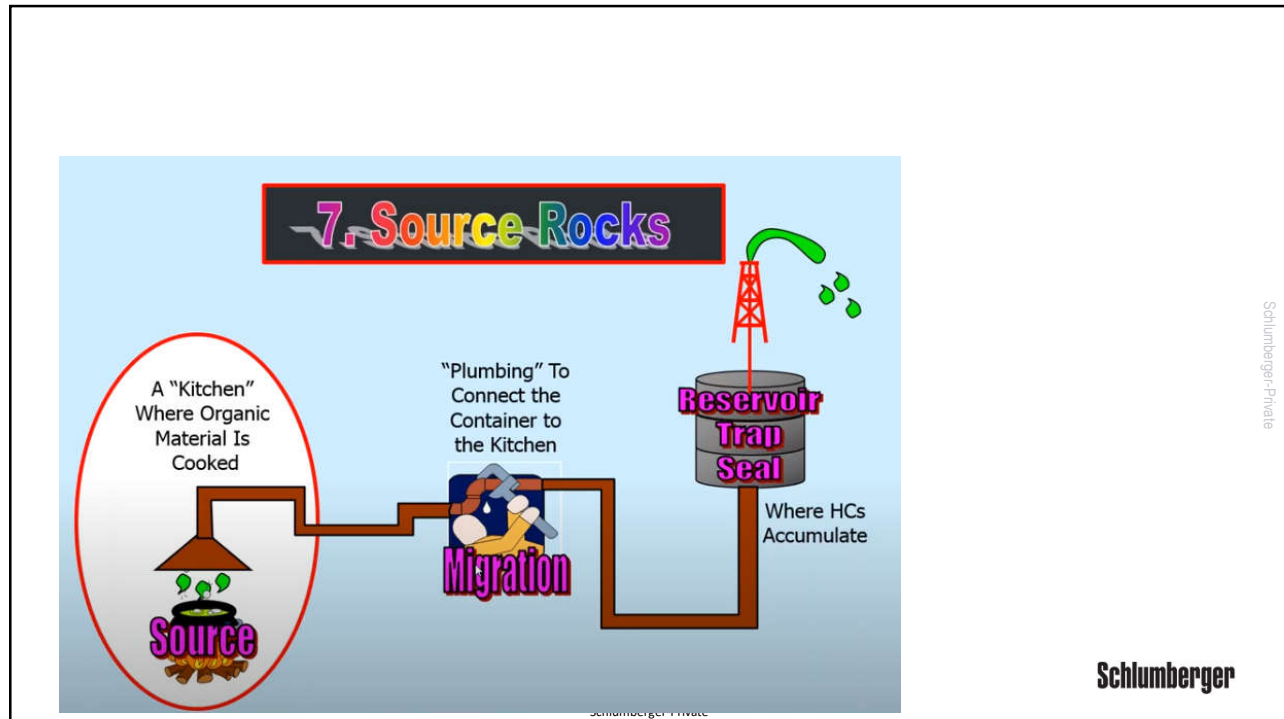
- Source presence (PSM)
- Distribution of reservoir (Presence) (Well calibrated Seismic attribute)
- Reservoir quality (Well calibrated seismic attribute)
- Trap (structural/stratigraphic) (Structural interpretation+attribute)
- Migration (PSM+Fault interpretation)

At any stage, information from seismic is important because of its lateral coverage

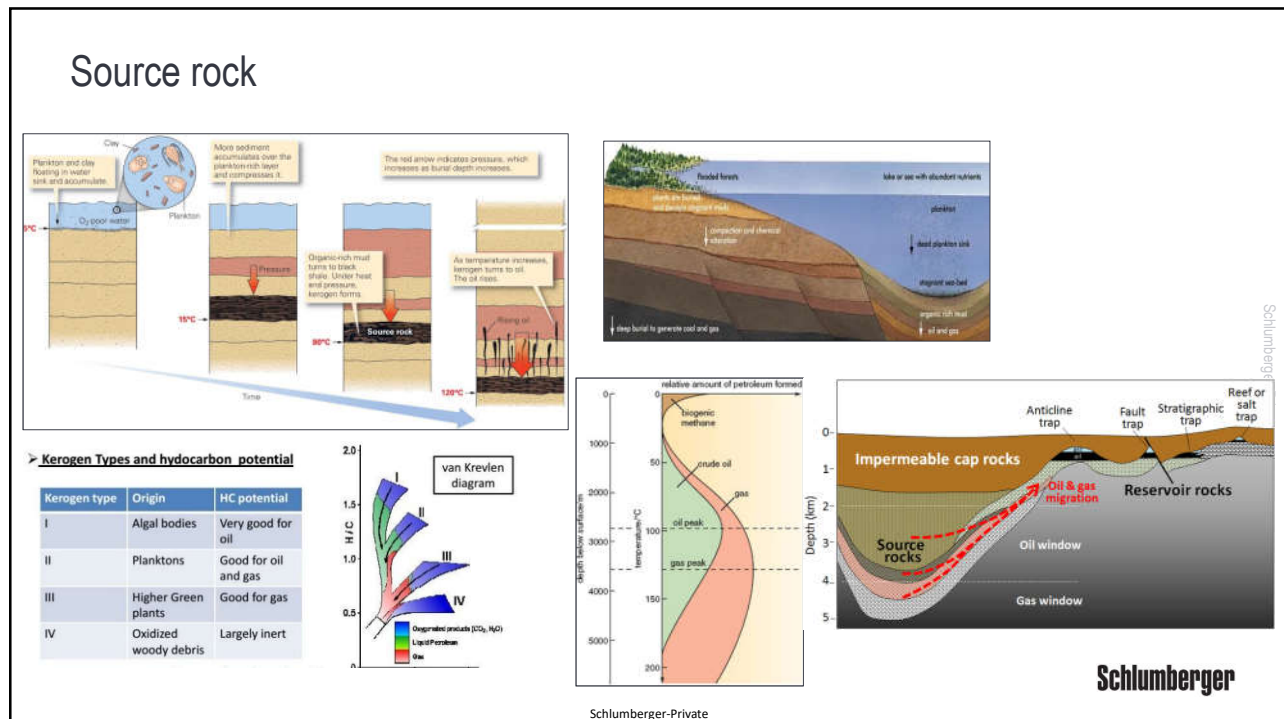
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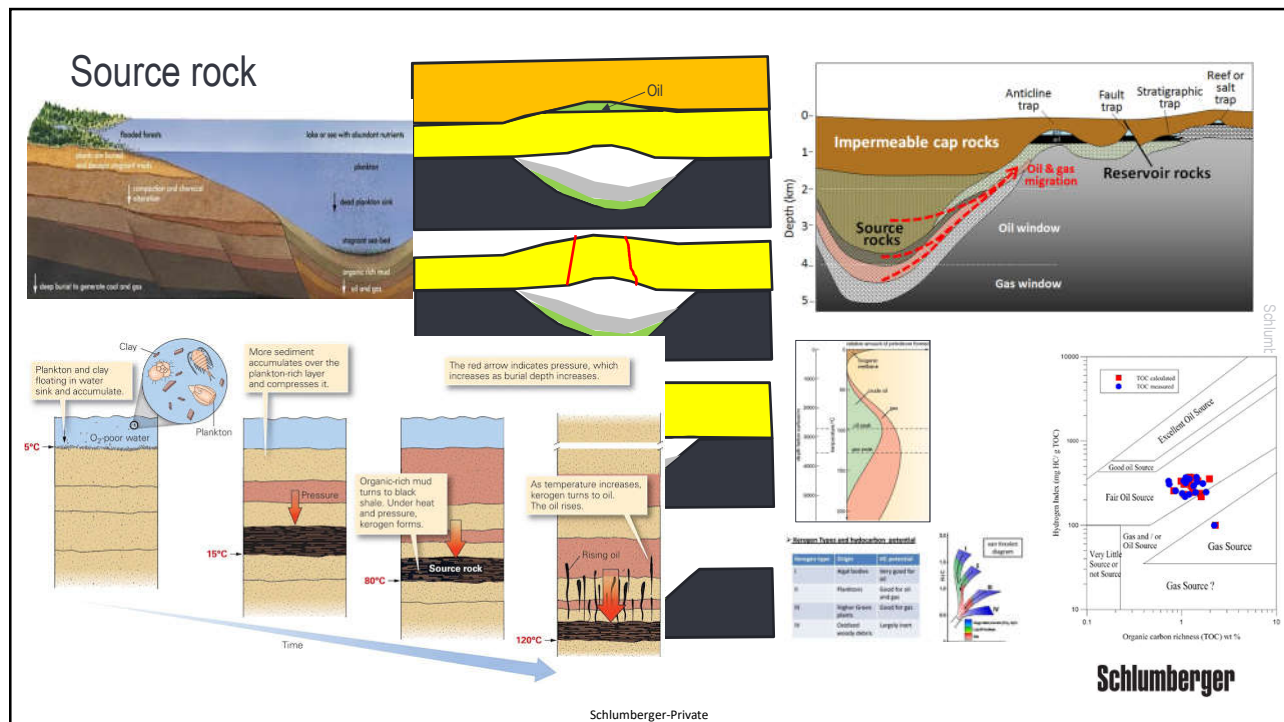
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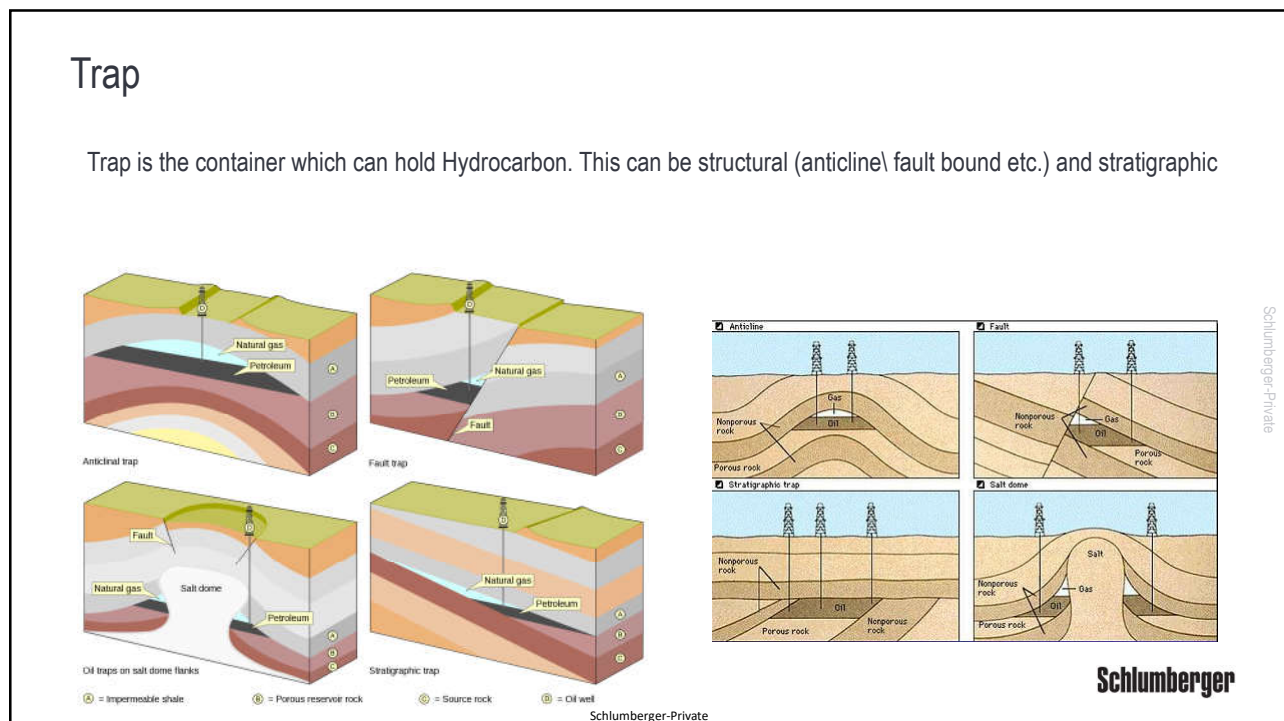
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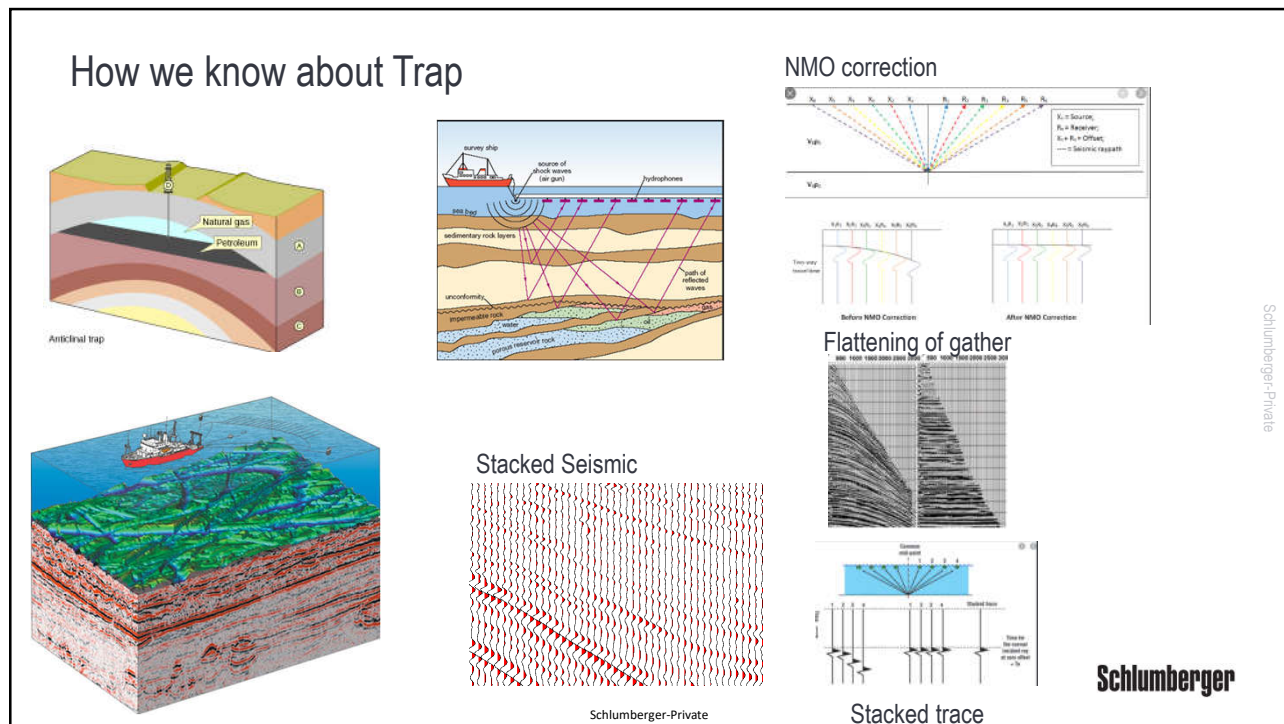
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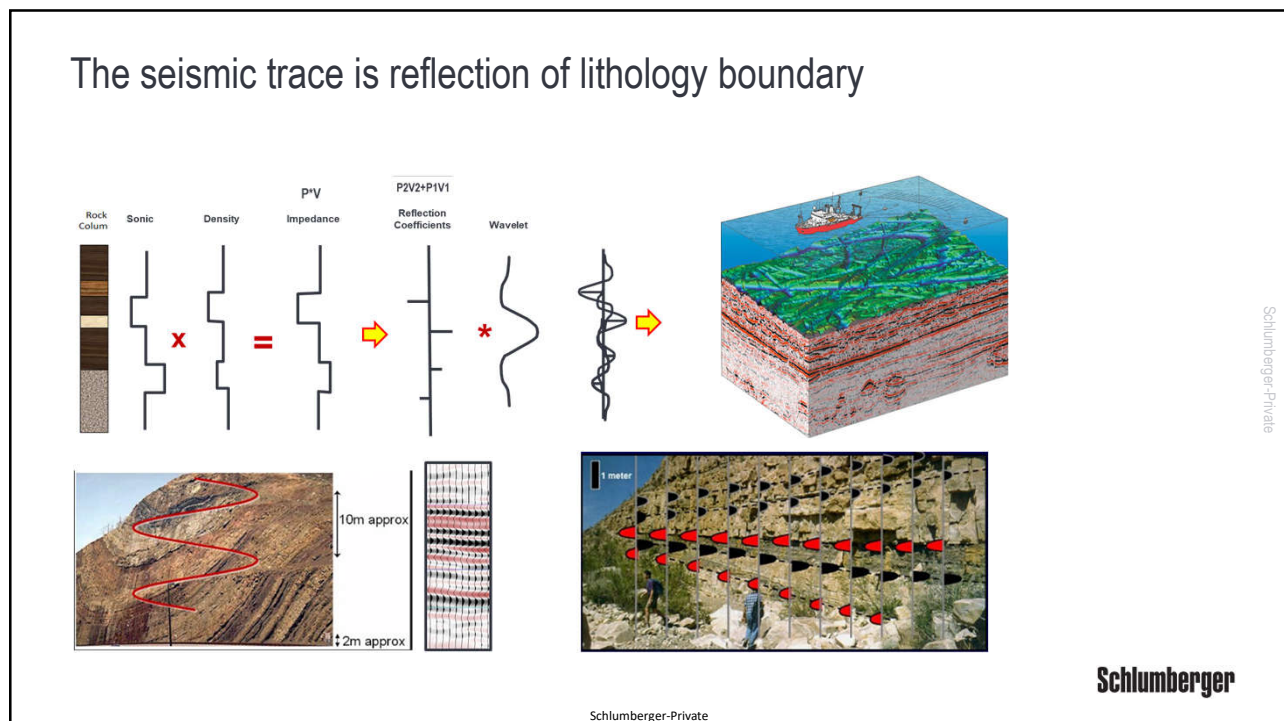
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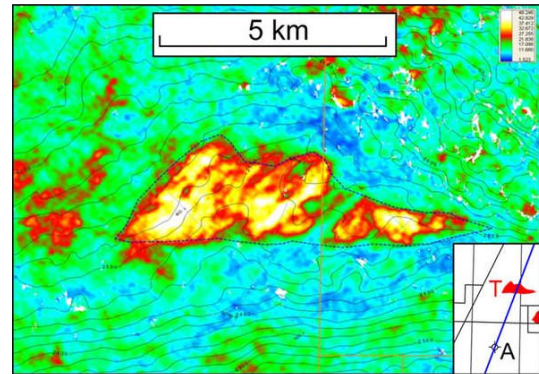
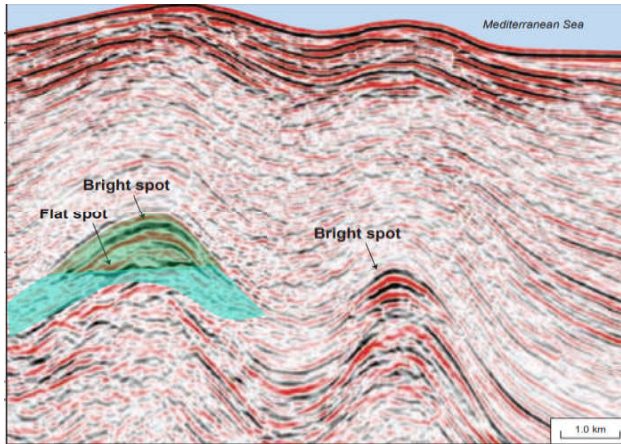


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Simple way to look into seismic anomaly to understand possible fluid effect

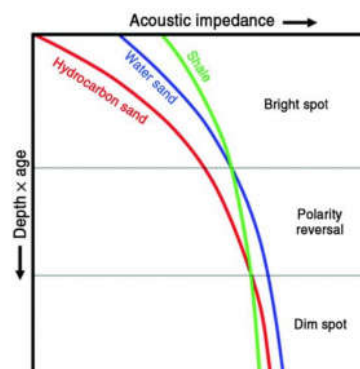
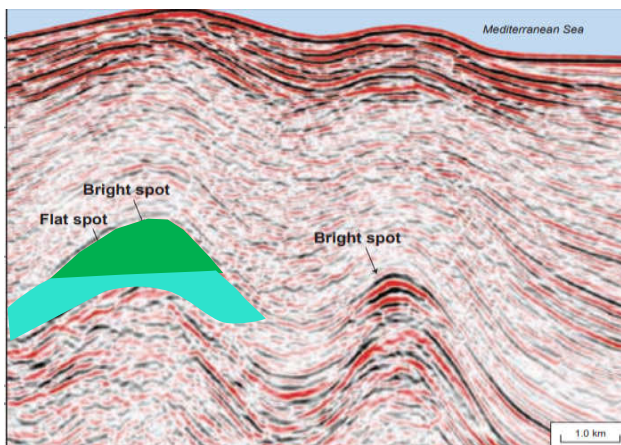


Paleocene trap west of Shetland, N. Loizou, 2014

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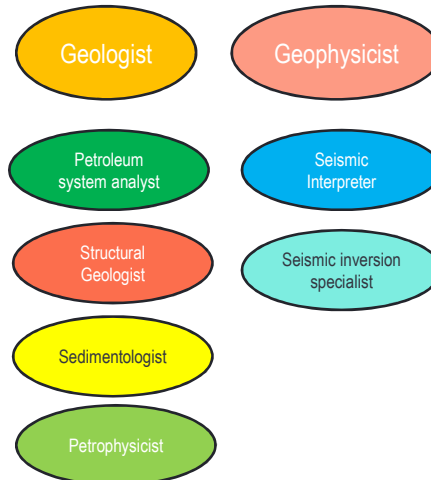
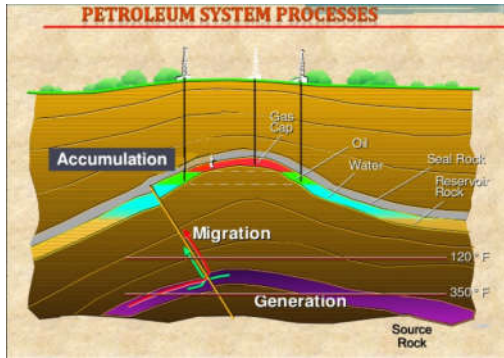


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Who are involved before drilling a well (exploration)



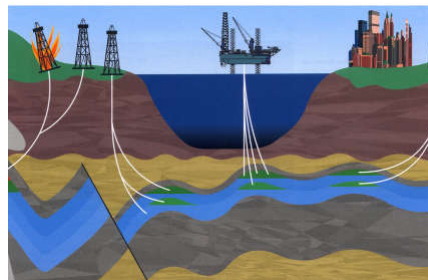
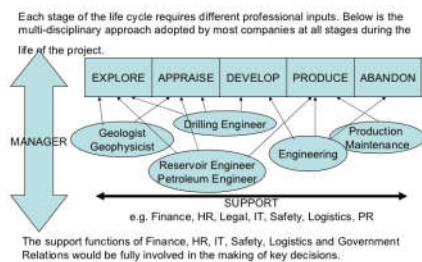
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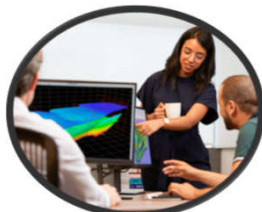
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What's next? Drilling a well



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Reservoir Engineer



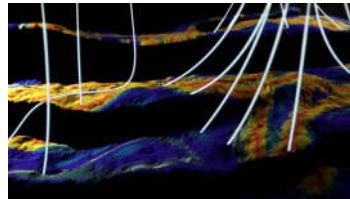
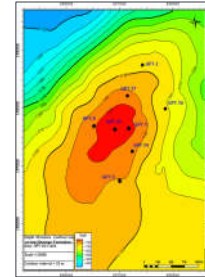
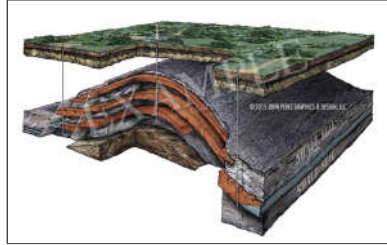
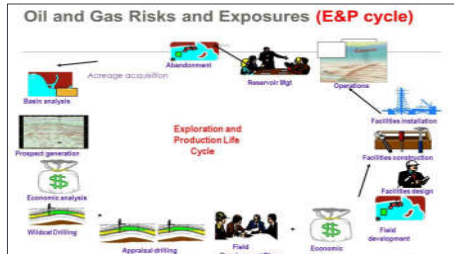
Drilling Engineer

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Appraisal and development



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Integration of key



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Thank you

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