Strategies to Optimize Reserves and Resources Development before Drilling: Case Study in the Llanos Basin, Colombia*

Yohaney Gómez Galarza[1]

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[1]Emerald Energy a Sinochem Company (yohaney.gomez@emerald.com.co)

Abstract

The development plan of a petroleum field must assure all relevant points are addressed systematically and accomplished before contract rigs, civil works for abdication in surface location and drilling operation. The main purpose of this presentation is to comment on all critical aspects required to verify and plan the strategies to optimize reserve and resource development along with a detailed geological and reservoir characterization before drilling. The decision drivers and variables could be incorporated as systematic project planning to have a complete vision and plan for both short and long term. In this presentation, I propose a workflow and identify a critical path to reach the optimum reserves development.

References Cited

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AAPG Latin America & Caribbean Region

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Co-hosted by the Colombian Association of Petroleum Geologists and Geophysicists

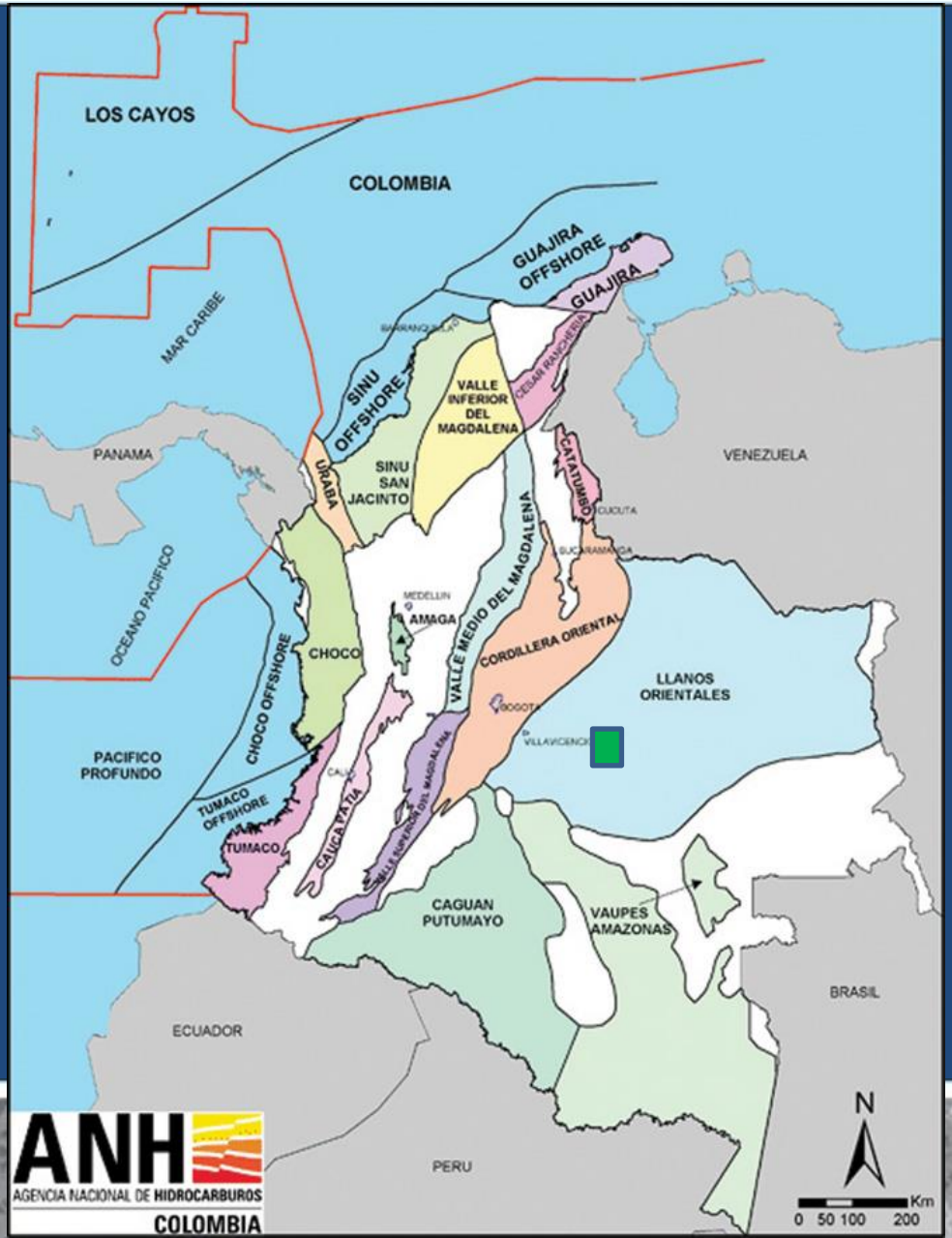
Strategy to optimize Reserves and Resources Development before Drilling: Case Study in the Llanos Basin. Colombia.

Yohaney Gómez Galarza
Emerald Energy a Sinochem Company

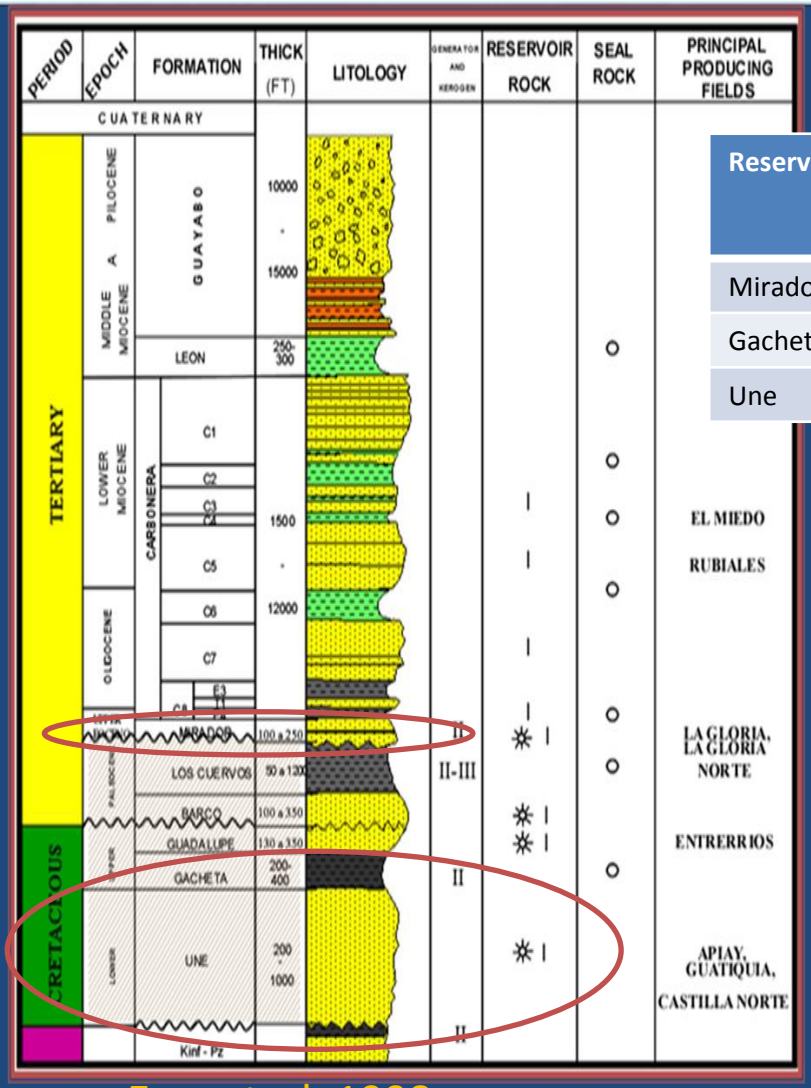
Agenda

- Regional Location
- General Data of Study Area
- Reservoir and Trap Description
- Main Focus to detail
- Reservoir Management
- Workflow for Reserves statement

Regional Location



General Data of Area

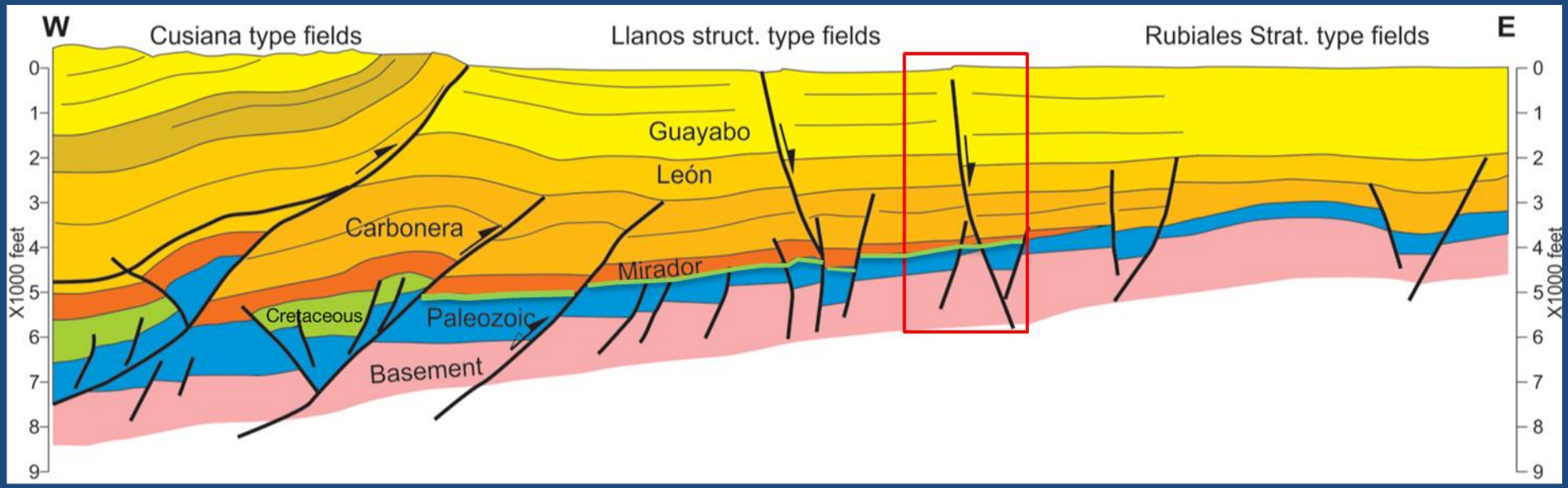


Reservoir	Net Gross, ft	Net Pay, ft	Porosity, %	So , %	STOOIP, MM BBLs	RF final, %
Mirador	50-70	15-25	20-23	65-80	10-15	30
Gacheta	20-60	10-15	12-25	65-85	5-15	30-45%
Une	60-90	15-20	20-23	60-80	13-15	25%

Source: Ecopetrol, 1998

Structural section of Llanos Basin (modified after Gomez, et al., 2009)

General Data of Area

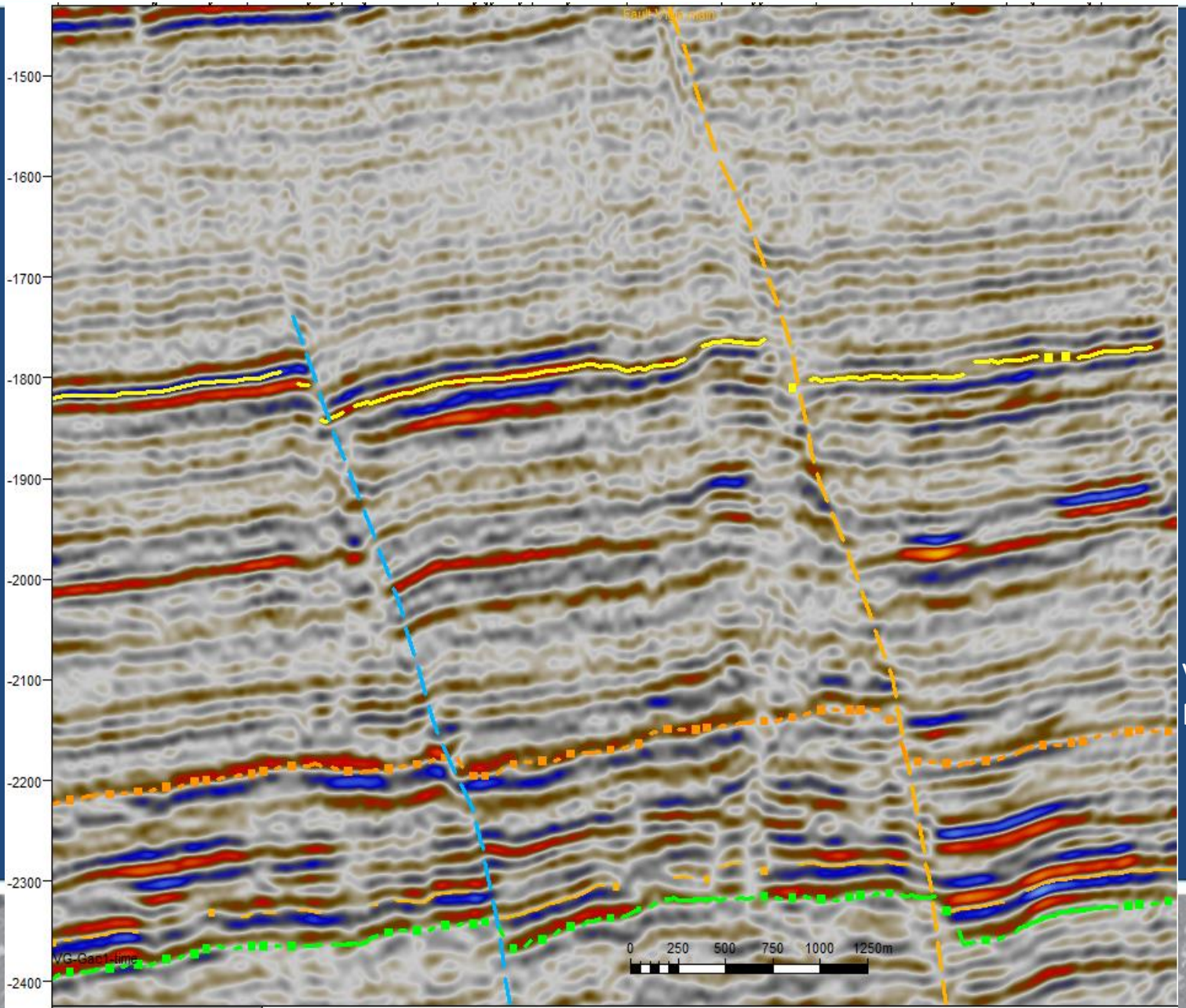


Structural section of Llanos Basin (modified after Gomez, et al., 2009)

General Data of Area

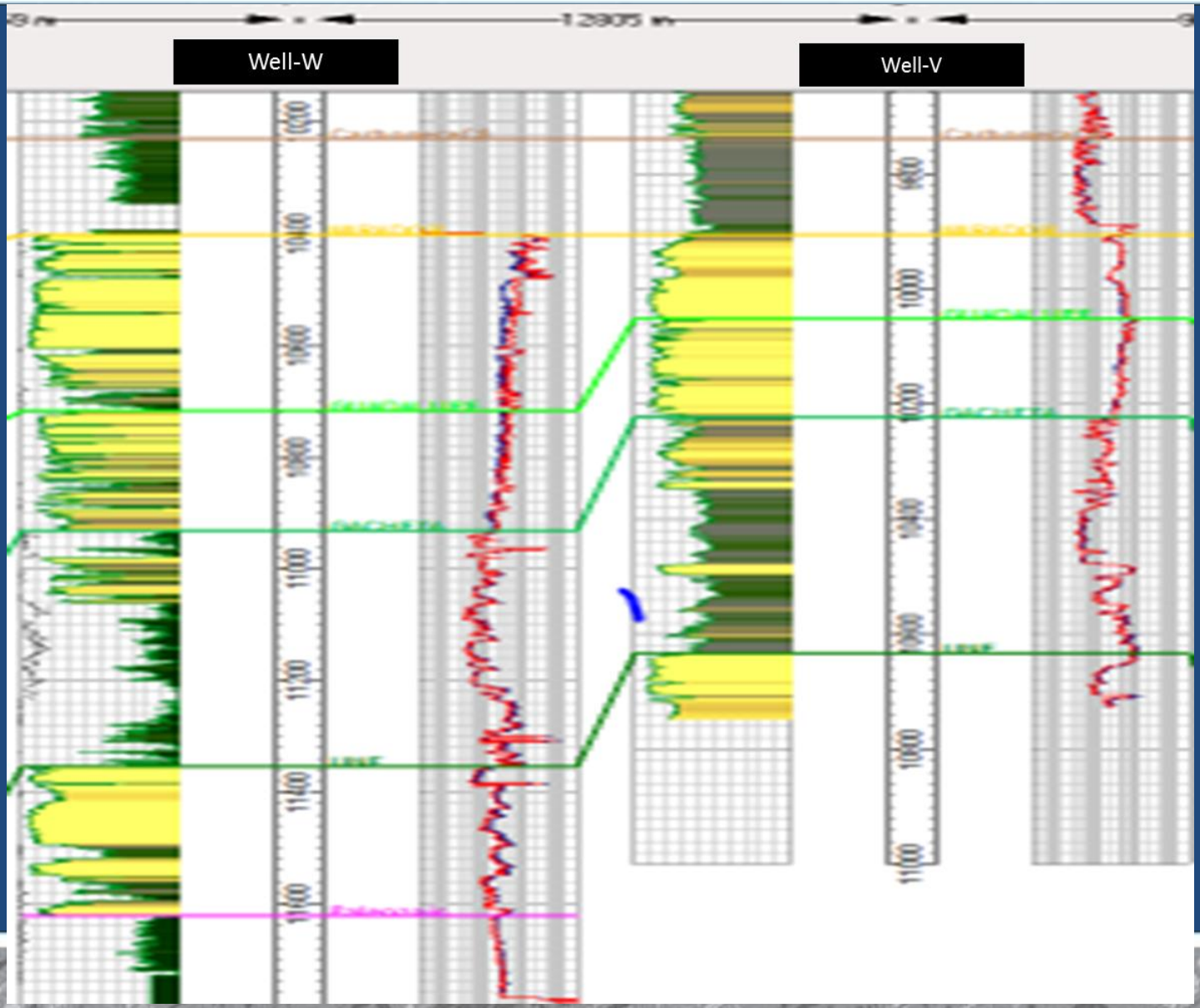
W

E



Variable
Fault throw

Reservoir



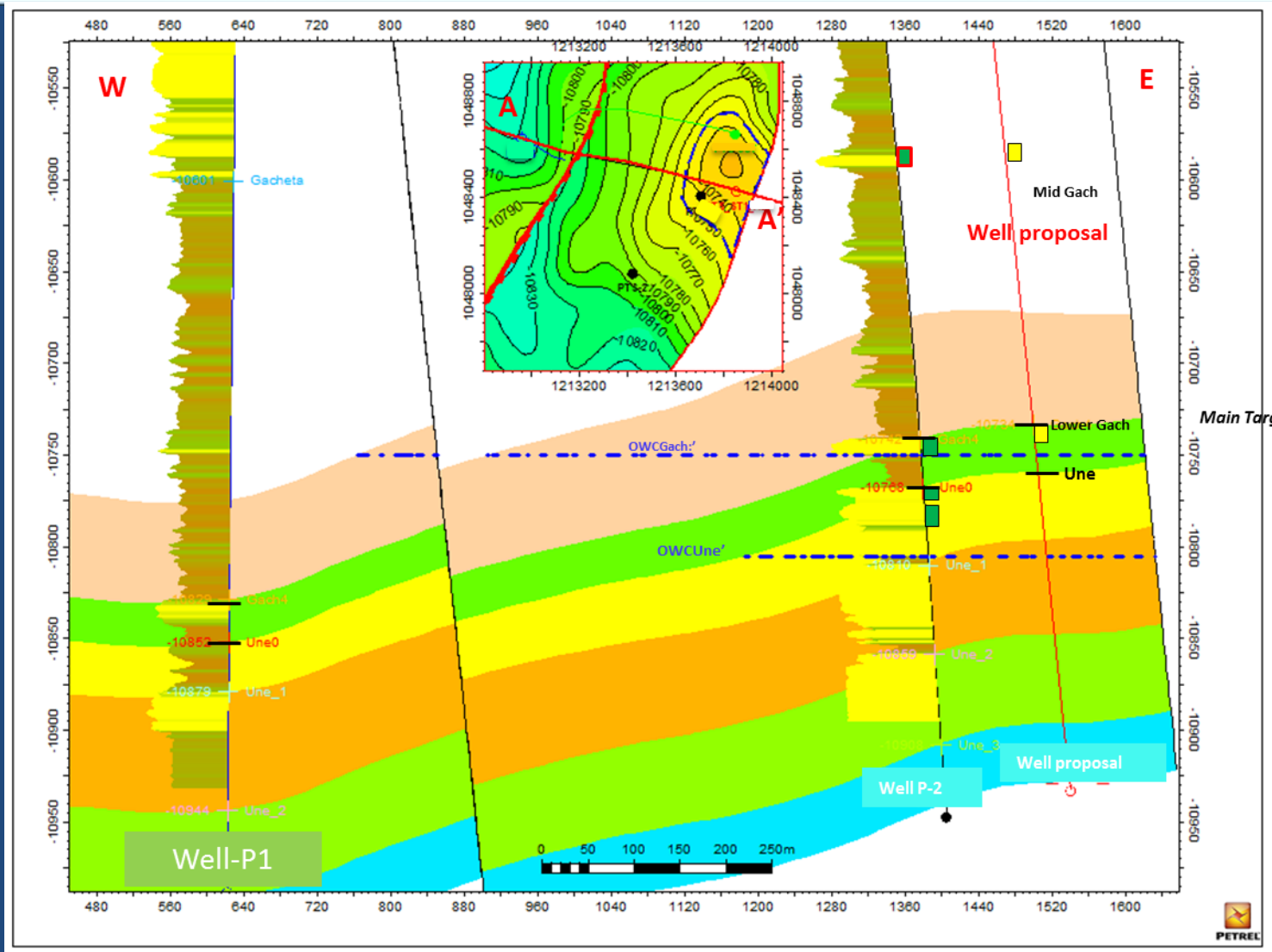
Main Focus

Do we have a Reservoir to store the hydrocarbons?
What are its characteristics?

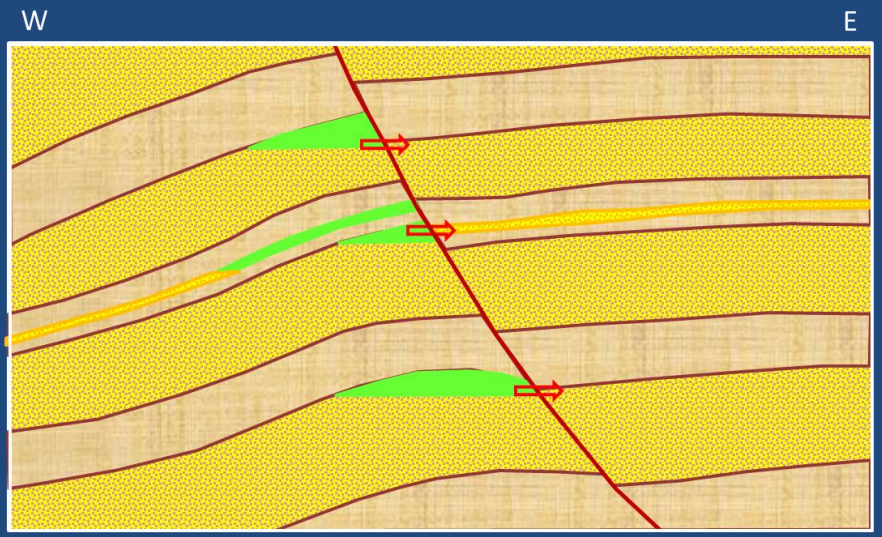
Is the Closure a trap to the hydrocarbons in the reservoir?
How big is it?

Is there a seal that will Contain the hydrocarbons to the present day?
How efficient is it?

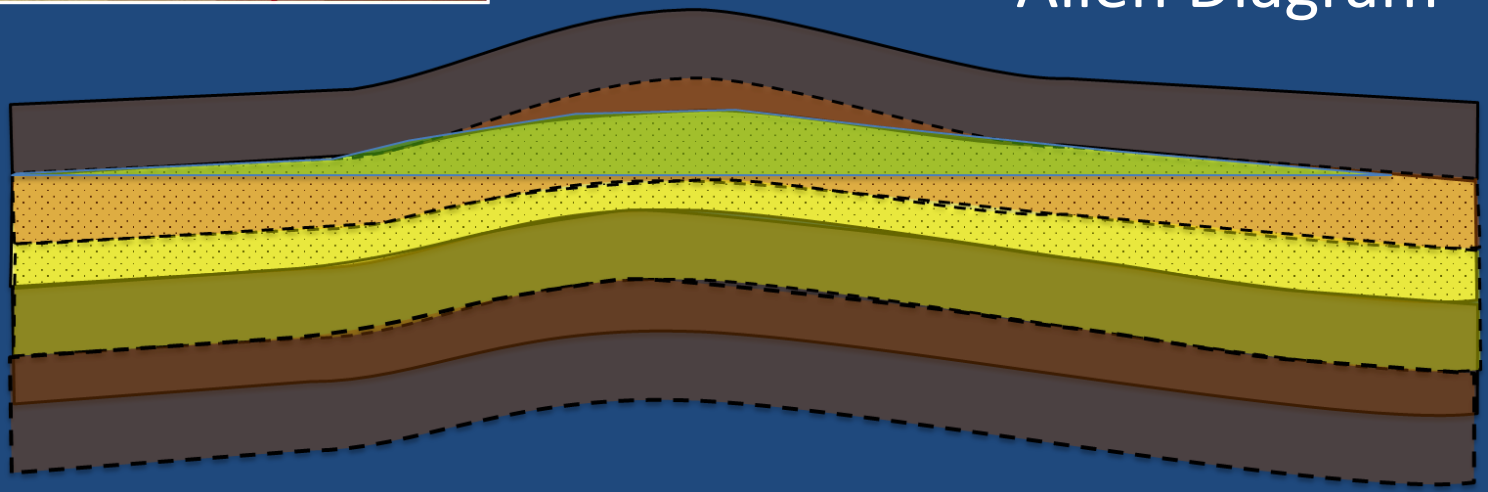
Trap


A
A´
W
E
A
A´
Gacheta
Mid Gach
Well proposal
Lower Gach
Main Target
OWCGach:'
Une
Une0
OWCUne'
Une_1
Une_2
Une_3
Well proposal
Well P-2
Well-P1
0 50 100 150 200 250m
PETREL

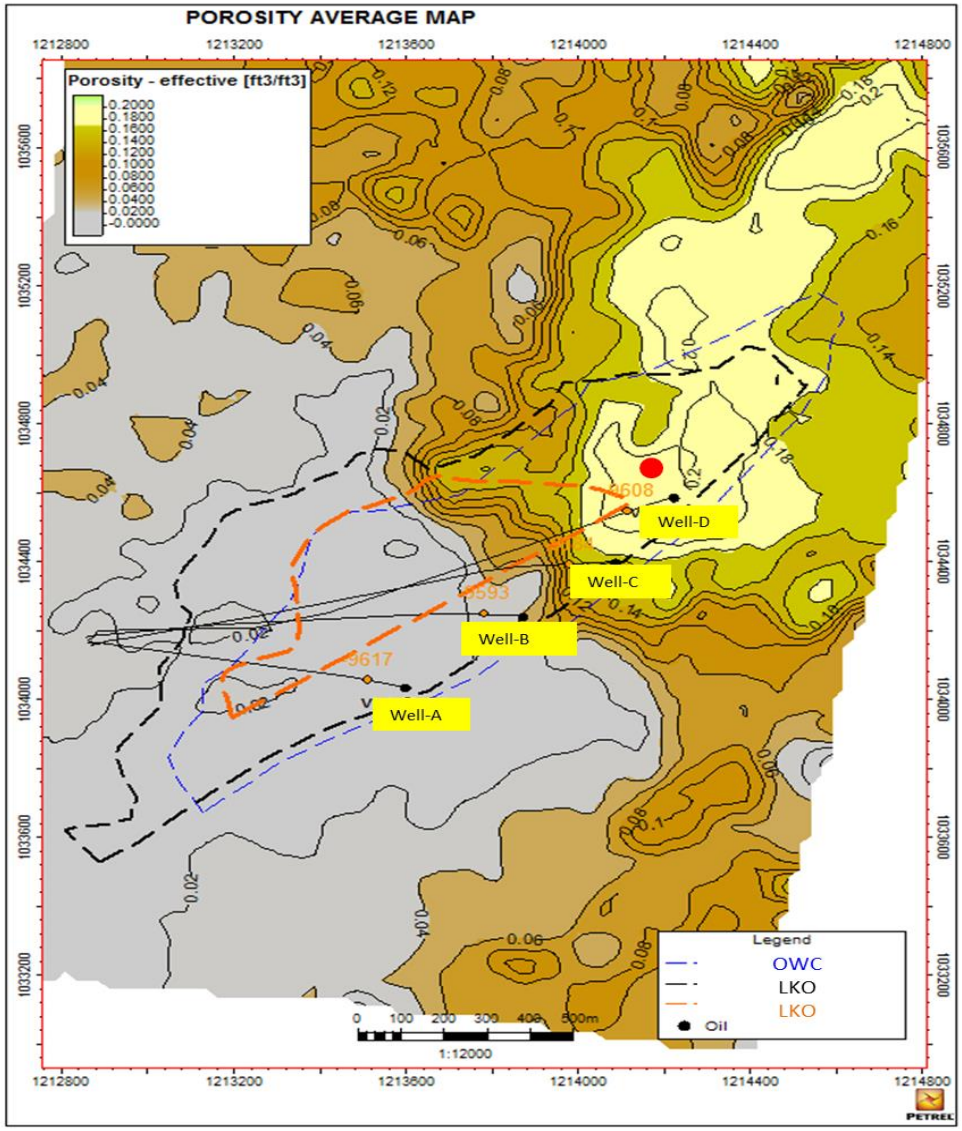
Yuxtaposition Analysis



Allen Diagram

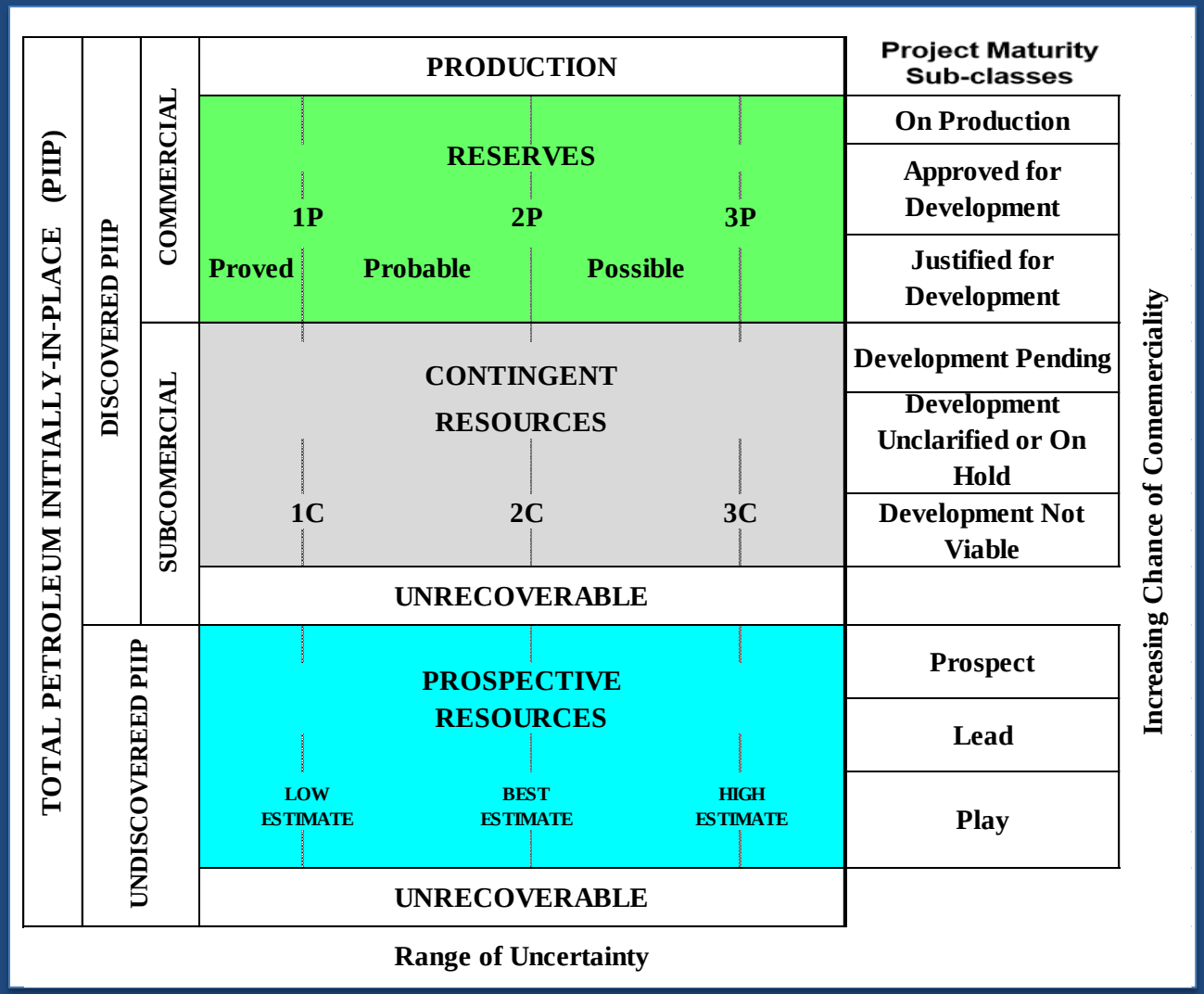


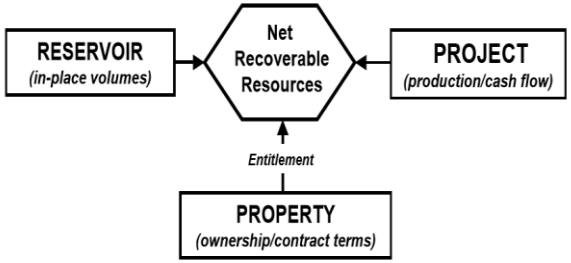
Reservoir Analysis



New interval was tested and taked PBU data

PRMS

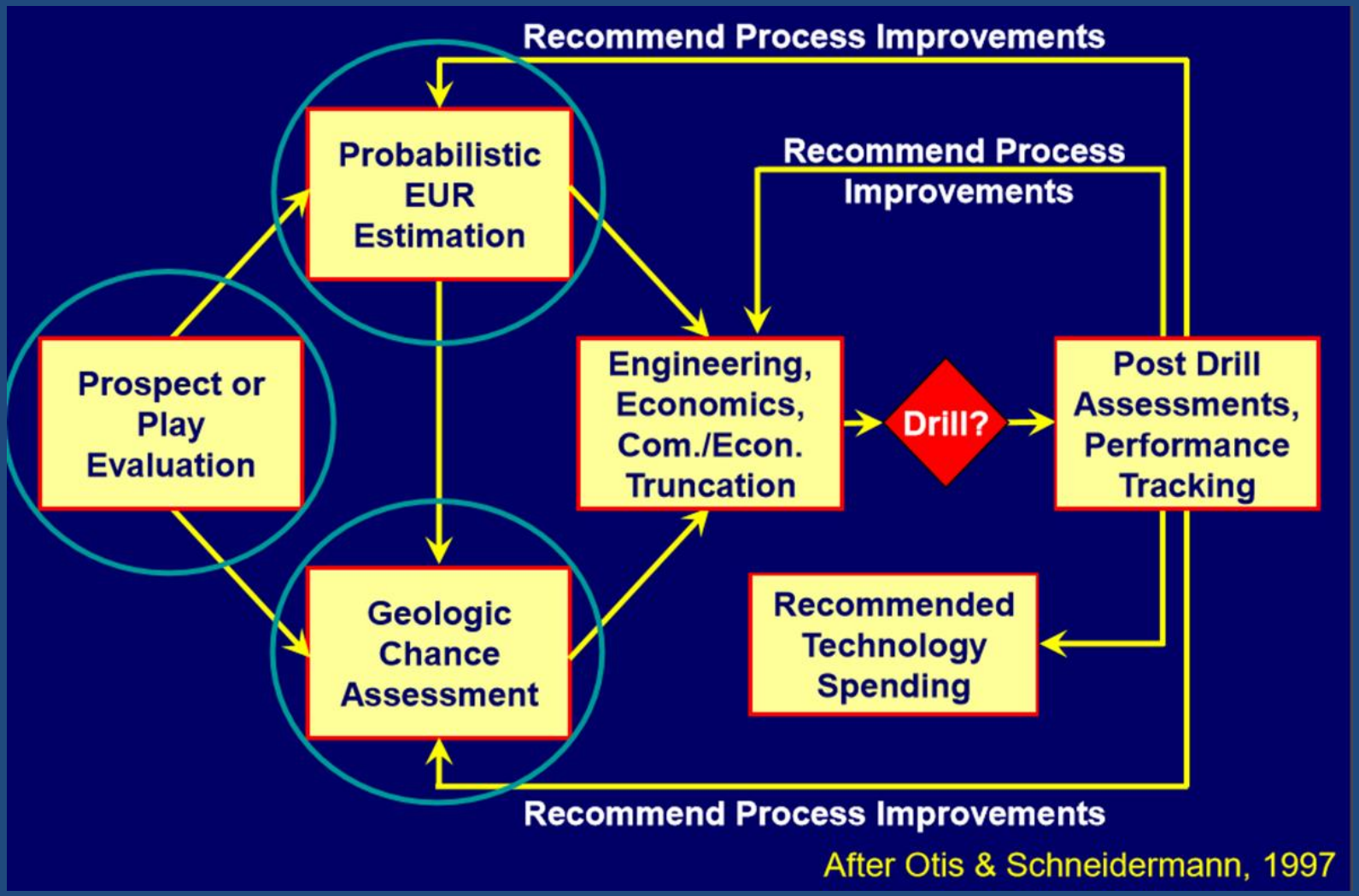




Guidelines for Application of the Petroleum Resources Management System

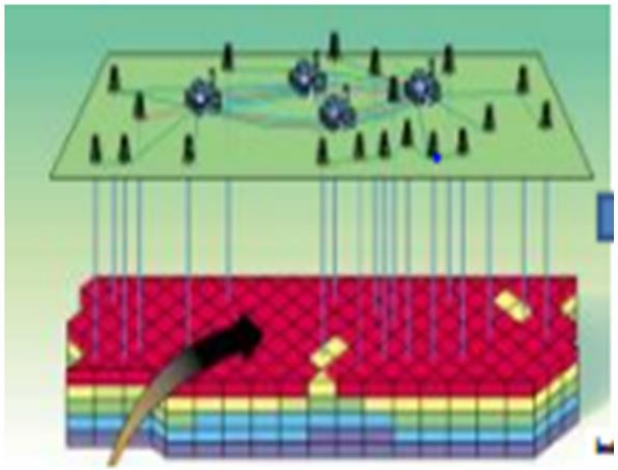
November 2011

Prospect Evaluation Process

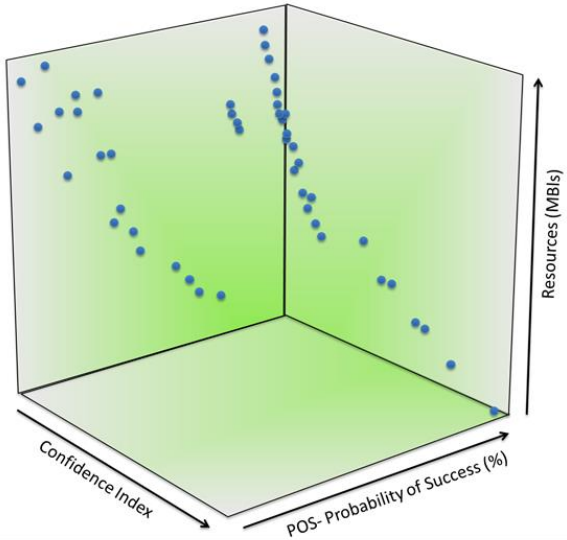


Integrated Portfolio and time table

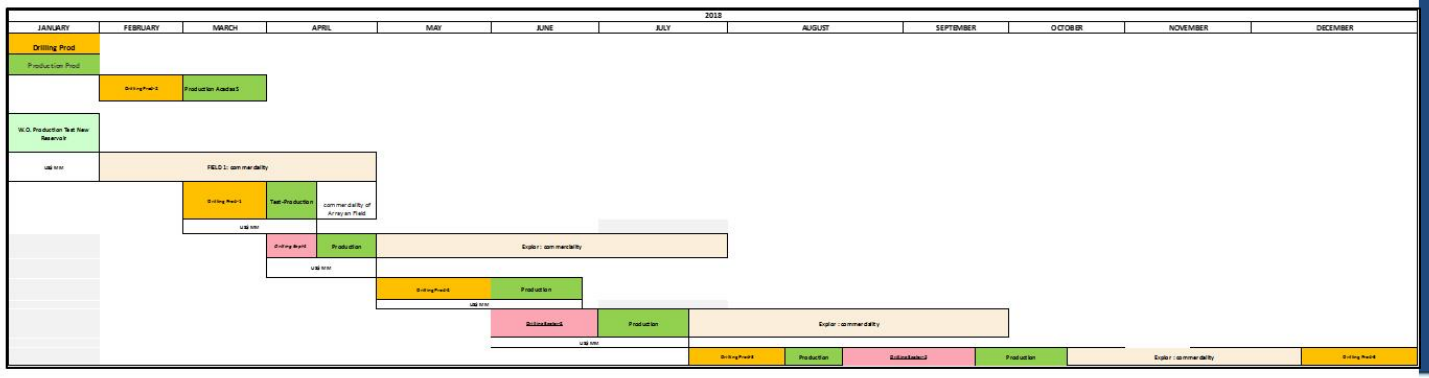
Integrated Portfolio

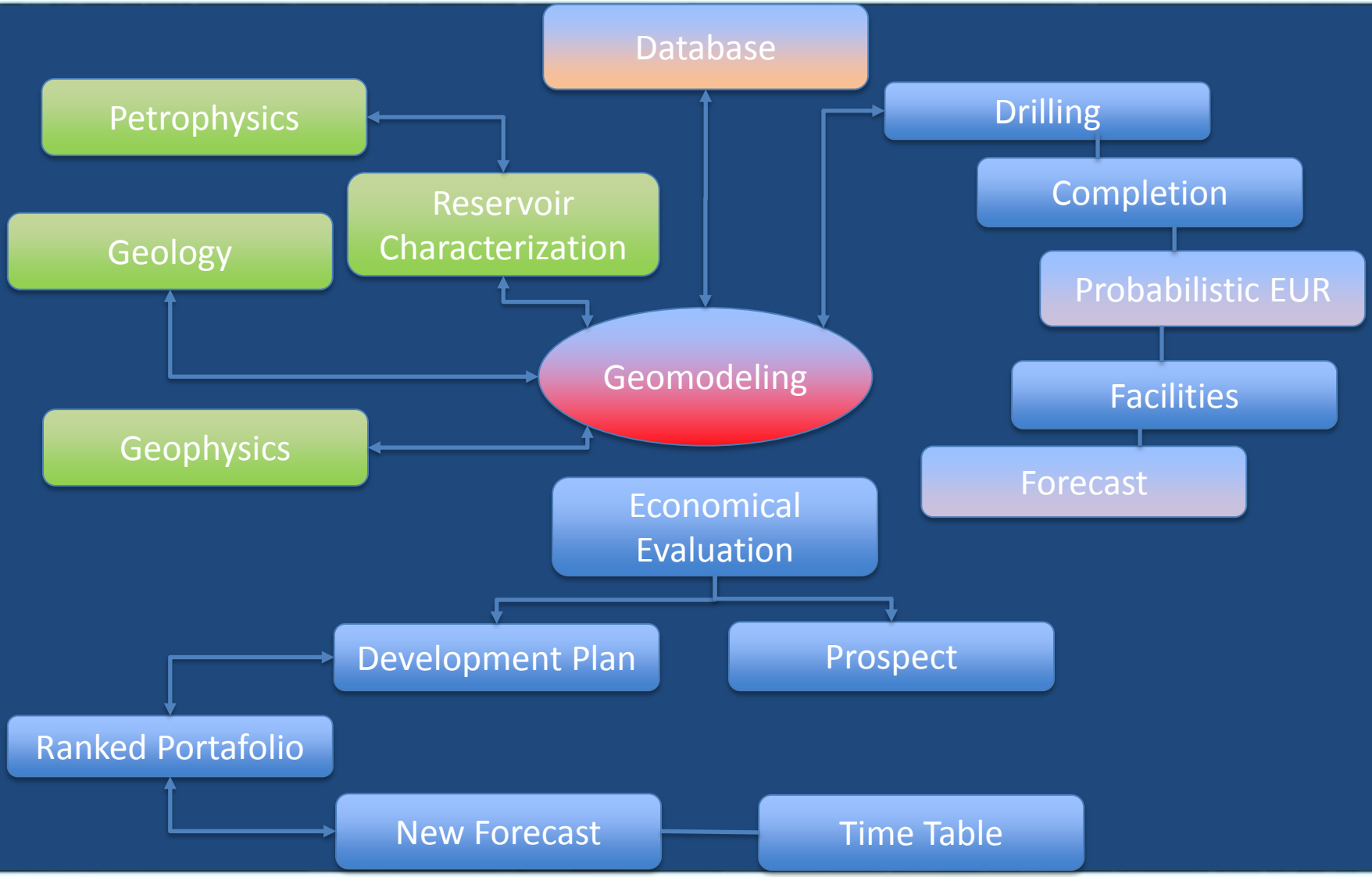


Integrated Ranked Portfolio



Time table




Database
Petrophysics
Drilling
Reservoir Characterization
Completion
Geology
Probabilistic EUR
Geomodeling
Facilities
Geophysics
Forecast
Economical Evaluation
Development Plan
Prospect
Ranked Portafolio
New Forecast
Time Table

Conclusions

- Foreland basin has a particular aspects such as multi-reservoir and multistage doing necessary a good reservoir management, drilling, completion and fluid management

- Testing new intervals in producer wells and Engineering data analysis (for example, PBU) are strategies of low cost that allowed to increase 20% the reserves and resources.

- Geomodeling is useful technique for 3D integration and evaluation of prospect and fields until simulation models that allow the development strategies and the evaluation of enhanced recovery feasibility, depending of the scale and detail used.

- Integrated and ranked portfolio allowed to add “value promise” at long terms combining risk of exploratory wells with development wells.