

# **PS The Power of Subsurface Integration in the Rejuvenation of an 89 Years-Old Field in Brunei\***

**Fauzi Said<sup>1</sup> and Carlos Nieto<sup>1</sup>**

Search and Discovery Article #20455 (2019)\*\*

Posted March 11, 2019

\*Adapted from poster presentation given at AAPG Middle East Region GTW, Maximizing Asset Value: Integrating Geoscience with Reservoir Management & Facilities Optimization, Muscat, Oman – April 30-May 1, 2018

\*\*Datapages © 2019. Serial rights given by author. For all other rights contact author directly. DOI:10.1306/20455Said2019

<sup>1</sup>Brunei Shell Petroleum, Jalan Utara, Panaga, Brunei ([Fauzi.Said@shell.com](mailto:Fauzi.Said@shell.com))

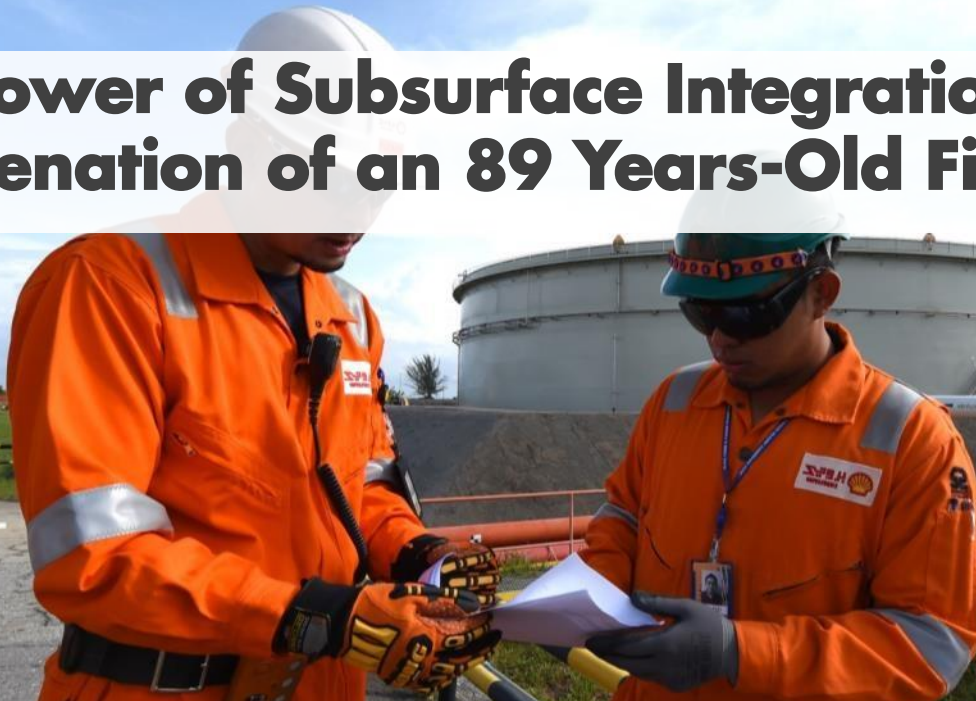
## **Abstract**

In Brunei, a mature field has been producing oil since 1929 from over 30 blocks, among which one block continuously producing since 1947. To date there are over 1000 wells drilled and three volumes of seismic data since 1989 with multiple processed versions, thus multiple datasets are available for analysis. Driven by the need to arrest the production decline, the project team aimed to identify production optimization and infill drilling opportunities for this block. Facilitated by well and reservoir reviews, the team analyzed data ranging from pore-scale rock properties and well production data to a field-scale detailed quantitative seismic interpretation. The subsurface team identified remaining hydrocarbons, drilling and completion team redefined technical boundaries and surface team maximized the value of existing brownfield facilities to deliver additional production at the lowest cost. This project started as a desktop exercise and ended up as the field's flagship rejuvenation project. Opportunities ranged from well optimization: convert wells to beam-pump or electrical submersible pump; to infill drilling opportunities: opportunity to drill four infill wells in the referred block. Reservoir uncertainties were reduced by collecting additional production data and drilling an appraisal well before the development wells. In 2010, during a performance reservoir review, a strong direct hydrocarbon indicator was observed on a reprocessed seismic 3D of data acquired in 1998. This triggered the interest of infill opportunities within the block. An additional 3D seismic survey, with higher spatial resolution, was acquired in 2014. The analysis and comparison of amplitudes extracted from these two surveys allowed the confirmation of current water cut depths obtained from producing wells within the block. The seismic effect of +50 years of accumulated hydrocarbon production was calibrated to the wells current water cut depth and gas-to-oil ratio, obtained from well production data, as well as to rock properties. Seismic inversion of both volumes was used to obtain probability maps of various rock and fluid properties,

which were used as a basis to optimize and de-risk proposed well trajectories of infill opportunities. This paper highlights the benefit of subsurface integration and the role it plays in maximizing existing fields and facilities. This example enabled the team to mature and execute opportunities that maximized the asset's value while keeping costs to a minimum.

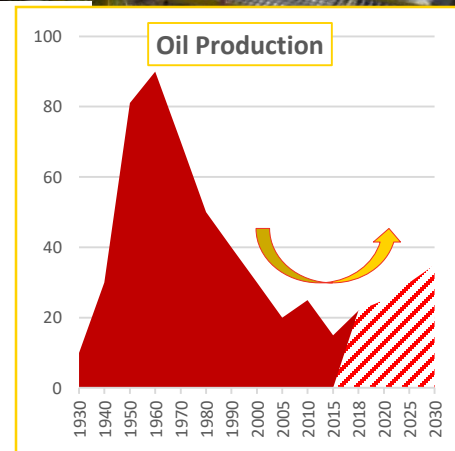
# The Power of Subsurface Integration in the Rejuvenation of an 89 Years-Old Field in Brunei

Fauzi Said, Carlos Nieto  
Brunei Shell Petroleum



## 89 Years-Old Field:

- Onshore field in operation since 1929, produced over a billion barrels.
- Aging brownfield facilities, increasing operating and development costs.
- Easy oil is long gone, production at its lowest.
- Pockets of stranded oil in a complex geological structure.
- Challenge to increase production with healthy Reserves-Replacement Ratio, in a brownfield environment.

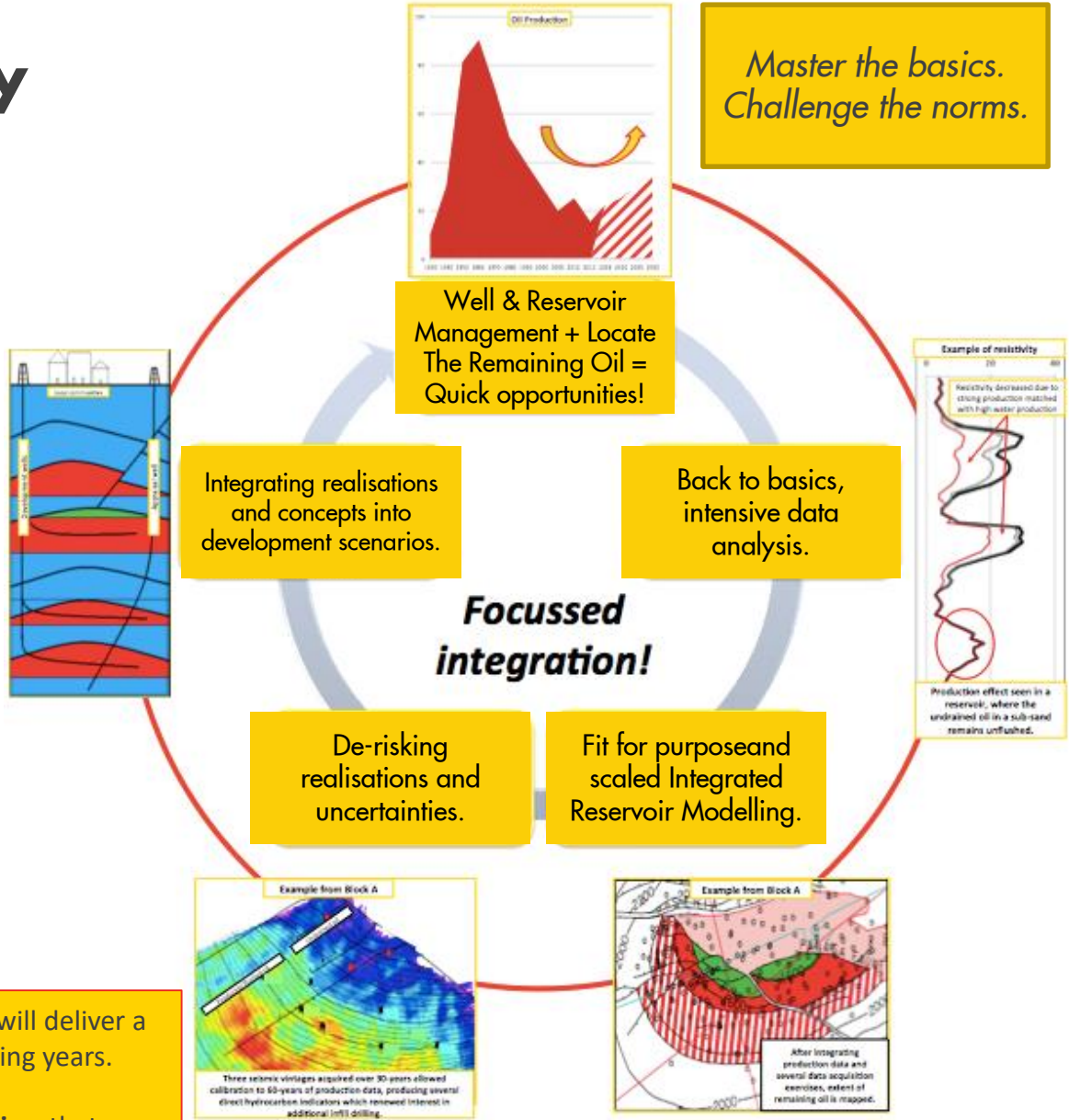


# Road to Profitability

- Agile
  - Adaptive, pragmatic and predictable processes scaled to the challenge eg. A scaled model robust enough to make decisions (map-based models, Sums and Averages, etc.)
- Nimble
  - Ability to successfully respond effectively and efficiently to changing circumstances eg. Changing well designs to adapt to new seismic.
- Collaboration
  - Leveraging on complementary skill sets from various disciplines in delivering the best value for the asset eg. Fresh perspective on legacy data.

This project kick-started a **portfolio rejuvenation** that will deliver a **sustainable higher hydrocarbon production** in the coming years.

This project highlights the role of **subsurface integration** that are strongly aligned with the company's business goals, **maximising asset's value** while keeping costs to a minimum.



***Thank you!***



*Credits go to: Brunei Shell Petroleum's DPE, DVM, TDM, TSG, TWP, AEF  
departments*