Getting Subsurface Right!

Ultimately, subsurface Science can be summarised as "drilling profitable wells"

The key is to learn how to do this in a predictable, repeatable way (as opposed to drilling 'on trend'; in a pattern; or effectively randomly).

We can classify the available tools as:

1. Rule-Driven Interpretation
2. Data Mining (using Analytics)
3. Modelling & Inversion

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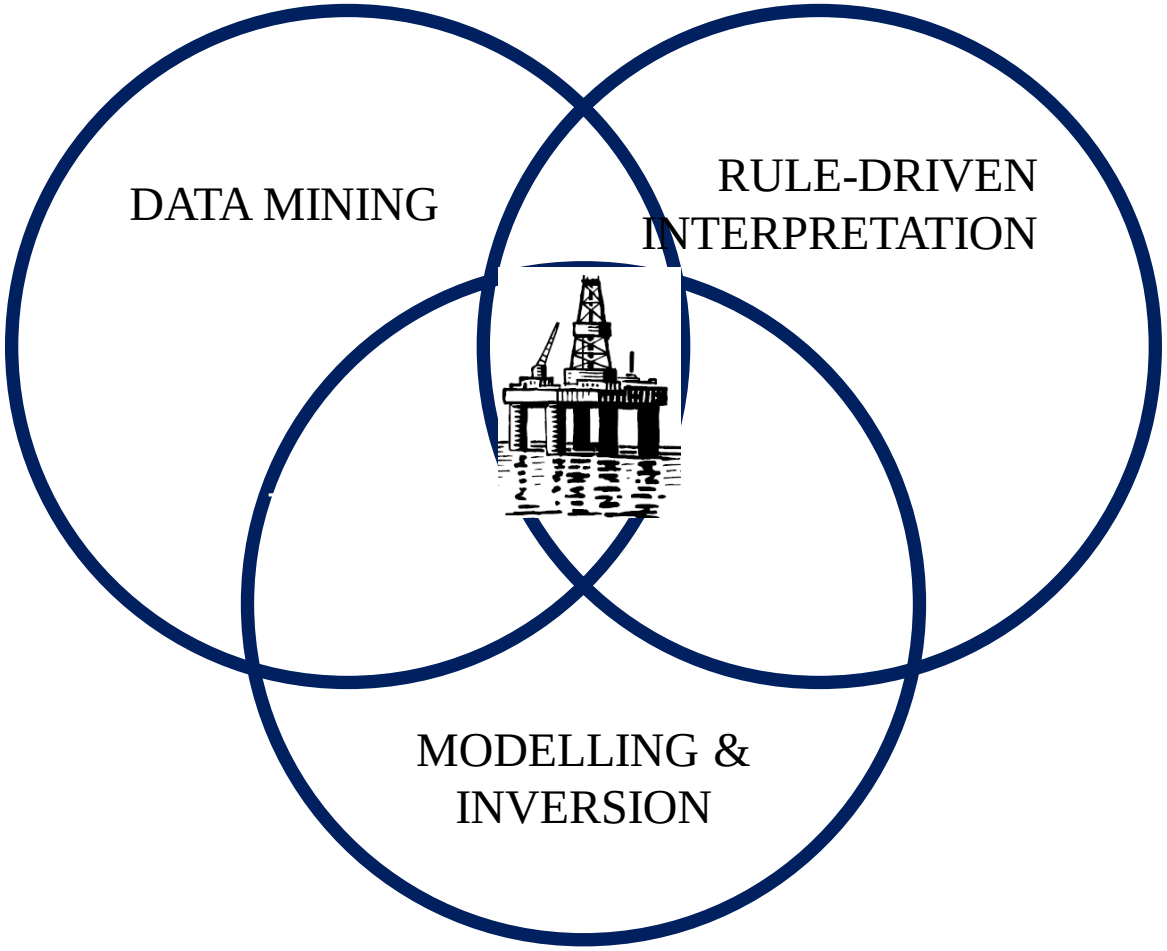

Rule-Driven Interpretation

- Well-established ‘rules’ have been proven for:
    - Stratigraphy
    - Structural Geology
    - Sedimentology
    - Petroleum Systems (especially creating GDE, CRS and CCRS maps)
- Nowadays most commonly applied through seismic data, normally 3D seismic data, increasingly multi-client…..

➢ This is now “commoditised” = not a source of competitive advantage; only disadvantage if done poorly…….

Data Mining

- We can access satellite and airborne data, a significant variety of well results (logs, cuttings, core, flow rates), potential field, seismic, surface geology etc from a wide range of proprietary and public sources in diverse formats, with different accuracy, coordinate systems, & units of measurement.
- We can be confronted with truly huge amounts of data and it is critical that we extract the key information from all of it rather than looking at only a sub-set and/or simply entering the analysis with a ‘going-in model’ which we then look to authenticate.
- Analytic techniques allow us to do this.

➢ Potentially a source of competitive advantage in mature basins……

Modelling & Inversion

- Predicting physical properties such as density, magnetic susceptibility, electrical conductivity, seismic velocity from geophysical data whether gravity, magnetic, electro-magnetic or seismic. Also addressing complex subsurface structures……
- Of all these technologies, seismic remains the most powerful = the least ambiguity, the most resolution etc. Provides a framework for other technologies……

➢ A source of competitive advantage if the integration issue can be cracked……

Key Technologies

DATA MINING:

1. The ability to integrate large quantities of diverse data.
2. Fast “Analytics” applications, tuned to the problem in hand.

MODELLING & INVERSION:

1. Integration of physically diverse multi-measurements.
2. Currently ‘Niche’ inversion + modelling applications.

RULE-DRIVEN INTERPRETATION:

1. Large quantities of inexpensive multi-client 3D seismic.
2. Commoditised interpretation workstations.

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