Fractured-basement rocks comprise some of the largest and most productive reservoirs on earth. However, success can be elusive in these complex reservoirs because of the lack of understanding of the fracture network.

The Schlumberger Data & Consulting Services (DCS) fractured basement workflow solution offers improved static and dynamic fracture reservoir modeling, including information to:

- highlight the fracture zone
- define new well targets
- select optimal tools for fracture characterization
- generate a realistic model to determine OOIP and reserves.

The workflow solution also offers an integrated approach to end-to-end quantitative analysis and modeling of flow-contributing zones.

Advanced tools and technology form only a part of this innovative workflow. Schlumberger has the worldwide experience and expertise to deliver results in fractured basements.

Schlumberger DCS delivers technical expertise and solutions as part of a robust evaluation technique that establishes a new benchmark for basement characterization. The workflow combines the most advanced Schlumberger technologies:

- FMI* formation microimager and and Sonic Scanner* acoustic scanning platform
- Triple-combo logs
- ECS* elemental capture spectroscopy

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**APPLICATIONS**
- Fractured-basement characterization

**ADVANTAGES**
- New well location optimization
- Detailed fracture and fault analysis
- Improved static and dynamic fractured-reservoir modeling for accurate original oil in place (OOIP) and reserves estimation

**FEATURES**
- Integrated approach for end-to-end quantitative analysis and modeling of flow-contributing zones
- Realistic model of subsurface
- Accurate identification of subsurface contributing fractures and descriptions of fracture connectivity and length

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Integrated, holistic fractured-basement modeling workflow.
Fractured-Basement Reservoir Workflow

- geoVISION* resistivity
- EcoScope* multifunction LWD
- SonicScope* multipole sonic while drilling
- Prestack time migration and prestack depth migration
- Production logging and mud logging
- Mud loss information
- MDT* modular formation dynamics tester and dynamic well testing
- Core data
- Thin section and laboratory mechanics test data

Developed and tested on Vietnam’s fractured-basement reservoirs and further implemented in locations around the world, the workflow delivers an advanced fracture network in 3D that takes into account the fracture geometry, orientation, distribution, and connectivity. The data integration technique is divided into the following steps:

1. identification of the potential flow-contributing fractures with detailed borehole geology and petrophysics analyses
2. prediction of fracture intensity in the interwell space using continuous fracture modeling (CFM)
3. generation of the discrete fracture network (DFN)/implicit fracture model (IFM) with calibration of the fracture distribution/geometry/orientation to well data
4. scale-up of the DFN/IFM model to evaluate fracture storage capacity and flow properties (porosity and permeability)
5. calibration with the dynamic data
6. designation and optimization of new well target and flow prediction.

The DCS fractured-basement reservoir workflow solution characterizes reservoirs to better enable modeling and define the best method to develop them. The holistic model created reduces drilling risks and increases drilling and production success.

The key aspects of this solution are:

- a unique workflow that identifies the potential flow-contributing fractures by integrating borehole geology and petrophysical analyses
- an optimized method to evaluate the fracture distribution, geometry, and orientation to match the well data and obtain a realistic statistical image of the fracture network representing the subsurface.