Unconventional Workflows in the Petrel Platform

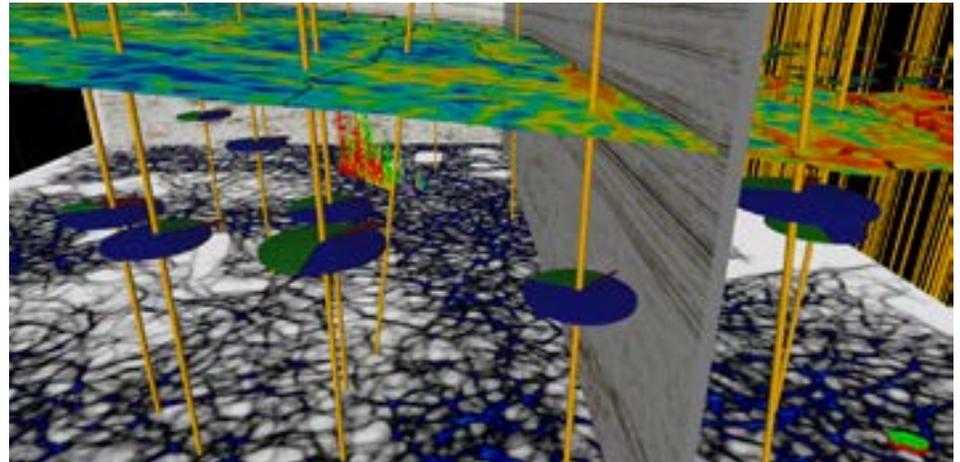## End-to-end workflows from exploration to production, specifically designed for shale

FEATURES

- Guided shale workflow
- Petroleum systems 1D modeling
- Play chance mapping to evaluate chance of success
- Regional multiwell correlation including digital and raster logs
- Seismic interpretation and mapping with surface and volume attributes
- Intuitive well positioning and design tools
- Efficient field-level pad planning tools
- Real-time geosteering
- Microseismic visualization
- Dynamic production mapping
- Intuitive filtering and searching through historical data
- Multiuser database access, subscriptions, and notifications, enabling collaboration among asset team

BENEFITS

- See all shale workflows in a single platform
- Work with tens of thousands of wells in a 3D canvas
- Identify the best acreage through play chance mapping
- Create fast maps and easily regenerate them with new data
- Identify your sweet spots
- Efficiently generate multiple well plans and scenarios to optimize field development
- Steer wells in real time
- Analyze production data in context of geology
- Collaborate with all members of your asset team through a multiuser database
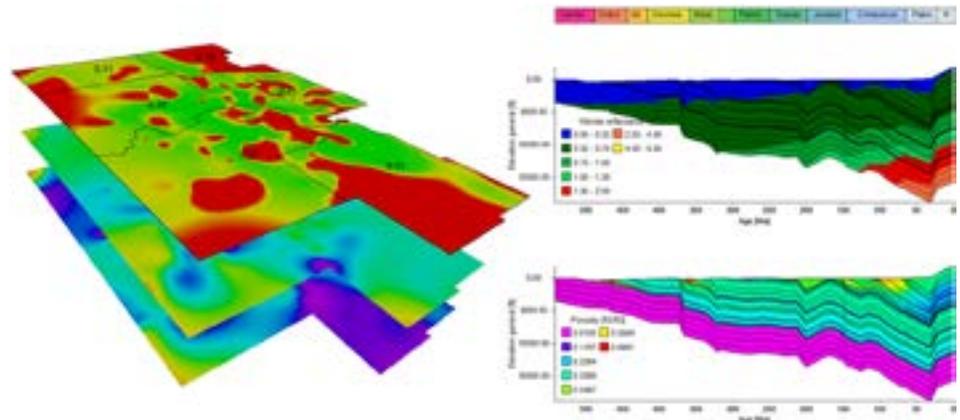
Establishing where and at what level to land laterals, how to space wells, and the optimal completion design to fully maximize resources are streamlined using the Petrel* E&P software platform and integrated Kinetix Shale* reservoir-centric stimulation-to-production software, which have been specifically engineered for unconventional resources.

Characterizing shale reservoirs from exploration to production.

Geoscience, drilling, completions, production, operations, and surface facilities information need to be rapidly brought together and analyzed to keep pace with the drilling program. Integrating and harnessing all this data via the Petrel platform is key to understanding well viability and maximizing every part of the resource.

The Petrel platform integrates geophysics, geology, petrophysics, completions data, reservoir engineering, and geomechanics into an earth model for a repeatable workflow to harness all the available data, providing operators with an efficient and productive unconventional reservoir system.

Play evaluation: 1D petroleum systems modeling and chance of success mapping to identify the best acreage.
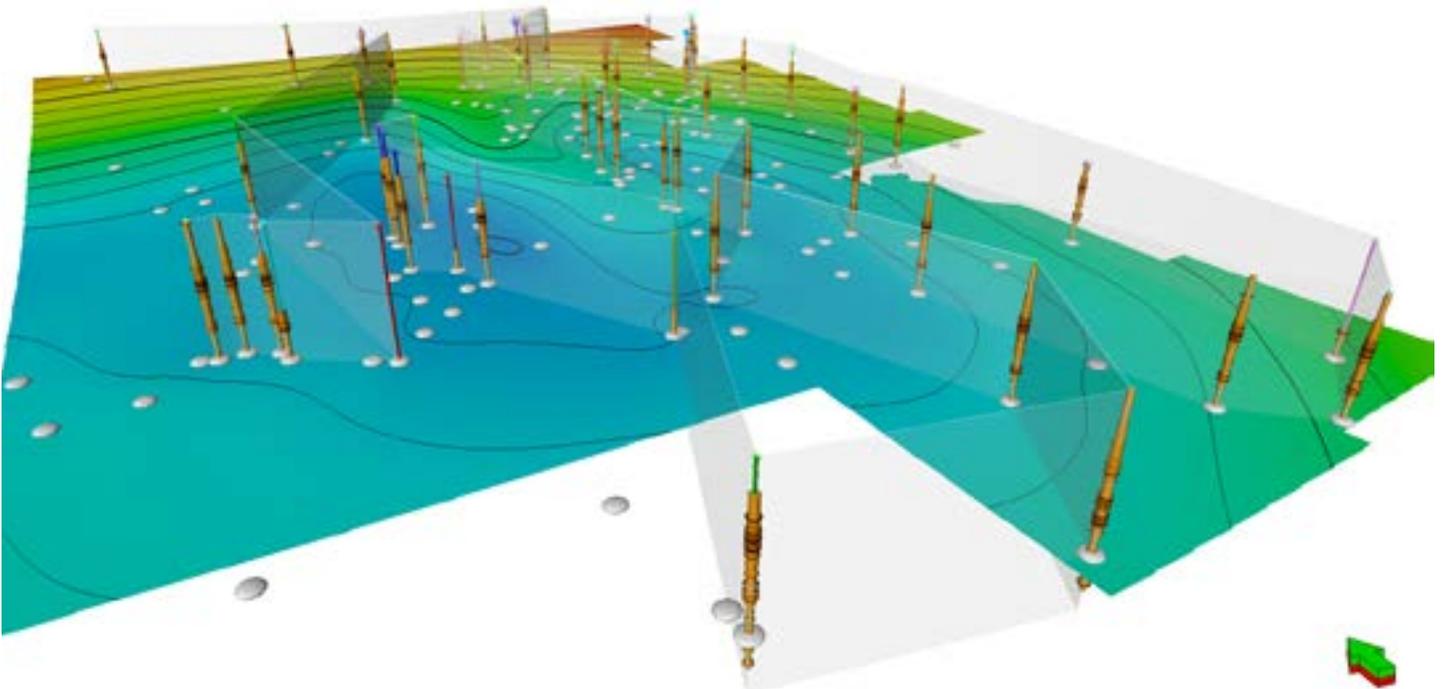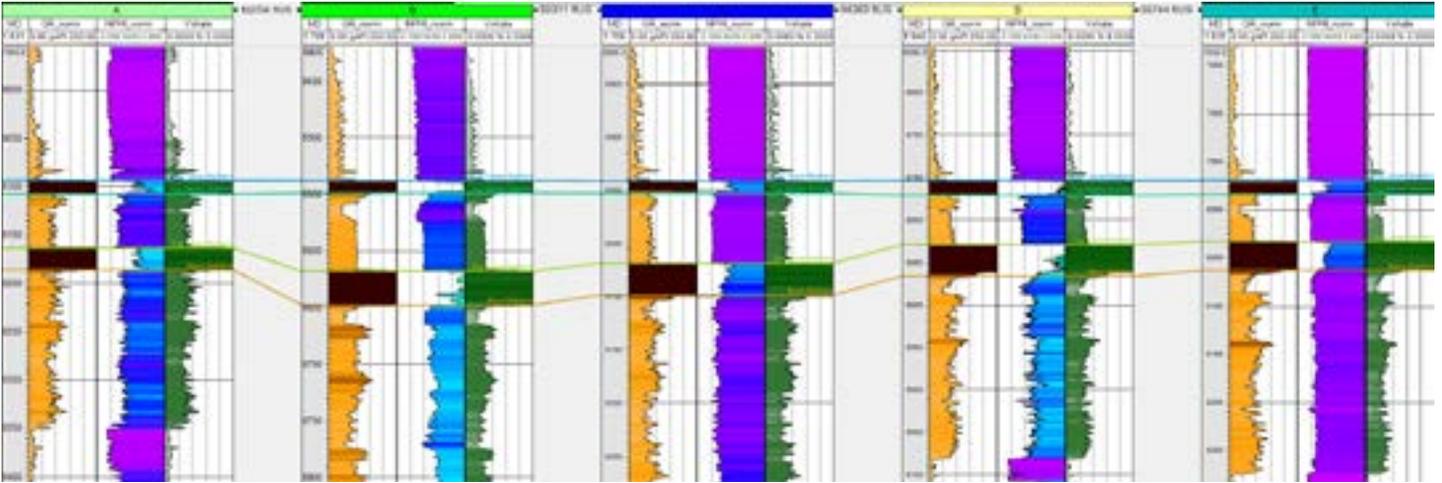
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Exploration and identification of the best acreage

Selecting the right acreage is critical for success in shale plays. The exploration tools built into unconventional workflows in the Petrel platform enable rapid initial exploration screening workflows, helping to determine which acreage to pursue. The 1D petroleum systems modeling simulation tool enables contextual understanding of the burial history, source rock maturation, hydrocarbon expulsion potential, and changes to properties over time from a wellbore perspective.
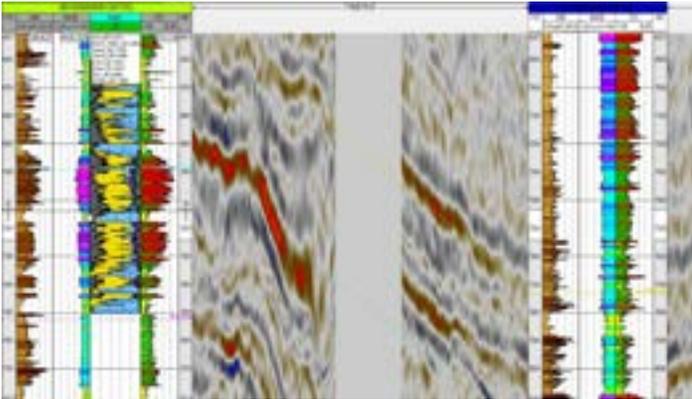
Using the play chance mapping functionality, property maps of play elements are transformed and combined into chance-of-success (COS) maps. Crucially, with the seamless integration across this workflow, COS maps can be readily updated with changes to play element maps.

Additionally, shale operations often require enhanced performance to deal with large quantities of data. With significant improvements to well performance, it is possible to work easily with tens of thousands of wells and log data in the 2D, 3D, and well section canvases.

Well correlation and mapping to understand reservoir thickness and distribution.

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Detailed well correlation combining mineralogical composition and seismic data.

Optimization of well design in context of cultural and geological data.

Geology and well correlation

Data consumption in shale plays requires coupling knowledge of the wellbore with regional well correlation and mapping. Unconventional workflows in the Petrel platform streamline map creation and cross-well interpretations in the context of local and regional data.
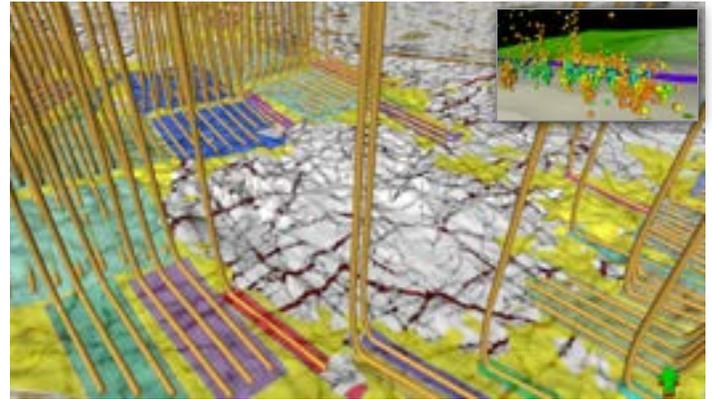
The correlation tools provide flexibility to rapidly interpret and validate stratigraphic markers using both raster and digital logs. Additionally, isochores can be easily generated and mapped to understand reservoir extent. Both public- and company-specific GIS map services can be streamed, providing geologists with access to topography, magnetic, cultural, and other data. As new data is acquired, maps can be easily regenerated to provide quick updates.

Integrated well planning and drilling

To viably operate in shale plays, drilling plans need to consider the best areas to drill based on reservoir quality and proximity to existing surface constraints while enabling quick, real-time updates based on new or evolving information. Unconventional workflows in the Petrel platform contain a multitude of tools that are utilized across the entire well planning and drilling workflow.
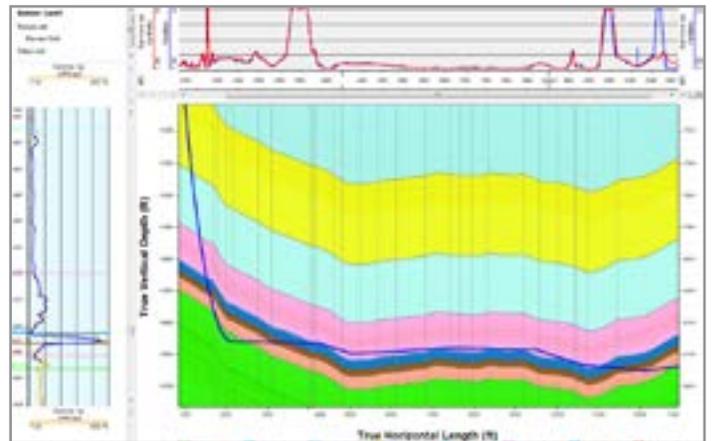
Pad placement provides an automated solution to optimize well pad locations based on surface constraints such as roads, rivers, proximity to facilities, and available lease acreage, as well as taking into account various reservoir-level quality targets. Type production curves can also be incorporated into the pad placement workflow, enabling the ability to evaluate the impact of different development scenarios given different acreage holding and well placement possibilities.

The well design process is efficiently organized to optimize well placement, where the combined focus on geoscience and drilling ensures that wells are planned in accordance with reservoir sweet spots, structural variations, and drilling risks by leveraging advanced drilling algorithms for rapid planning of multiple pads and single wells.

Drilling information such as encountered risks and lessons learned on offset wells can be shared with newly planned wells to ensure continual improvement in drilling efficiency and safety. Geosteering combines the real-time well data that can be streamed into a project with well data from an offset well to apply a series of structural changes so that reservoir contact can be maximized. Results are easily incorporated with geologic maps, or into a geosteering history report at the click of a button.
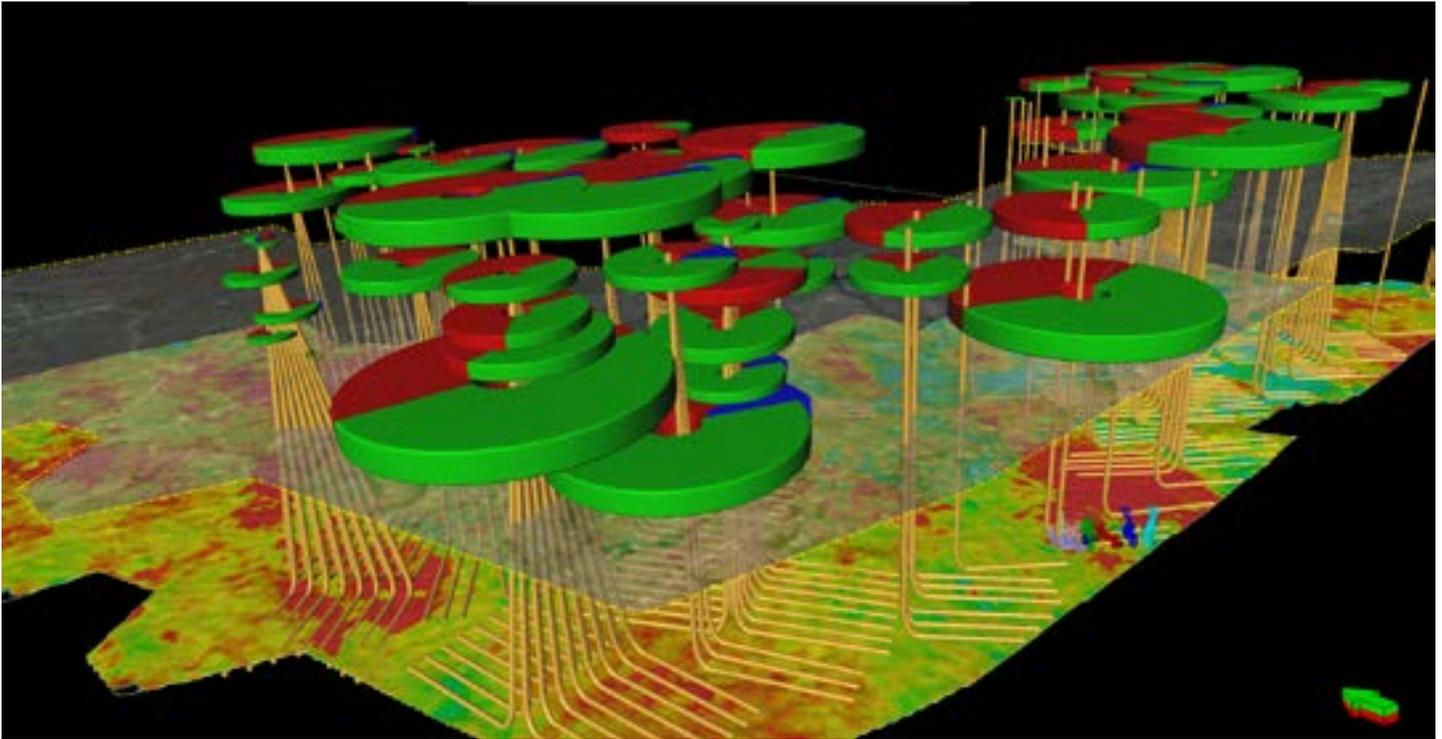

Staying in the zone with real-time geosteering.

Production data in context

Integrating production data with geoscience information enables gaining a greater understanding of how production relates to geology. Unconventional workflows in the Petrel platform allow users to analyze production data by creating in-context, dynamic production maps at either well or field level to understand how production corresponds with geology over time. The shale analytics tool provides linear and nonlinear multivariant analysis to predict production maps and volumes so users can compare a variety of geological, geophysical, drilling, and completion parameters with results from areas with varied production.

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Understanding production trends by linking historic production with geology.

Making knowledge work

The Studio* E&P knowledge platform is available for unconventional workflows in the Petrel platform, ensuring efficient collaboration between all geoscientists in the team. In addition to receiving instant notification of data updates across the organization, users can easily add new data to the Petrel platform's workspace as it is acquired from the field. Furthermore, the Studio platform provides unique and unrivalled capabilities to quickly find and retrieve any relevant data, directly within the context of the workflow at hand.

Workflow extensibility

Unconventional workflows in the Petrel platform are flexible and scalable map-based solutions. As part of the Petrel platform, workflows are easily extended from map- to model-based interpretations. Model-based workflows provide enhanced functionality, including geomechanics and flow simulation, thereby extending capabilities to model and simulate hydraulic fractures in time through engineered stimulation design.

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