

Paradigm's volume-based subsurface modelling

Oil and gas E&P software company Paradigm reports a big take up of its SKUA volume-based subsurface modelling software suite in 2013.

Oil and gas E&P software company Paradigm reports that it has seen the adoption rate of its SKUA volume-based subsurface modelling software "really jump in 2013."

All of the modelling in SKUA is made in 3D, rather than modelling faults and horizons initially in 2D and then fitting them together in a 3D structure afterwards, as is conventionally done.

This means that as you model your faults and horizons in 3D, you can see how they all fit together, and check that they make geological sense.

"Manipulating volume data is much more resource demanding than manipulating 2D data," says Stan Jayr, commercial director for Interpretation, Modelling and Data Management at Paradigm. "Recent advances in computational processing, combined with our unique visualization technology have finally made true 3D modelling a reality."

"The fastest growth in take-up for SKUA has probably been offshore Latin America, particularly for modelling under salt," says Indy Chakrabarti, SVP Strategy and Commercialization with Paradigm.

However, the software has been used in a wide range of environments, including deep water and unconventionals, by oil companies of all sizes. Two customers showing particular interest in SKUA for seismic interpretation and modelling are Petrogal Brasil, an operator in Brazil, and SCDM Energie, a company that owns Investcan Energie, which is active in Eastern Canada.

The software also has the ability to view your subsurface model in a flattened space, so you can see if there is a reasonable geological story about how the subsurface ended up the way you think it currently is.

Paradigm calls this "UVT Transform capability" – with U and V referring to the axes of your model, rather than the original x and y coordinate locations of the present geology, in different periods of time (T).

Once you have made a UVT model, you can use it to generate velocity models, geological grids (for geostatistical analysis), reservoir simulation grids, 2D prospect maps, geomechanical grids, and 4D basin modelling grids.

It also has advanced tools that give you a better sense of your uncertainty, both by keeping track of the amount of uncertainty in your data as the modelling progresses, and by tools that test your current model to see if it would make sense if (for example) the faults were placed in a different position.

"Understanding uncertainty in subsurface models should go a long way in helping oil and gas companies make smarter investment decisions in exploration wells," Mr Chakrabarti says.

The software has many tools for automating subsurface processes, so they can be done faster and with less need for expert knowledge. "The software does not go as far as to give a 25 year old the same modelling capability as an experienced 55 year old, but is aiming to move in that direction," Mr Chakrabarti says.

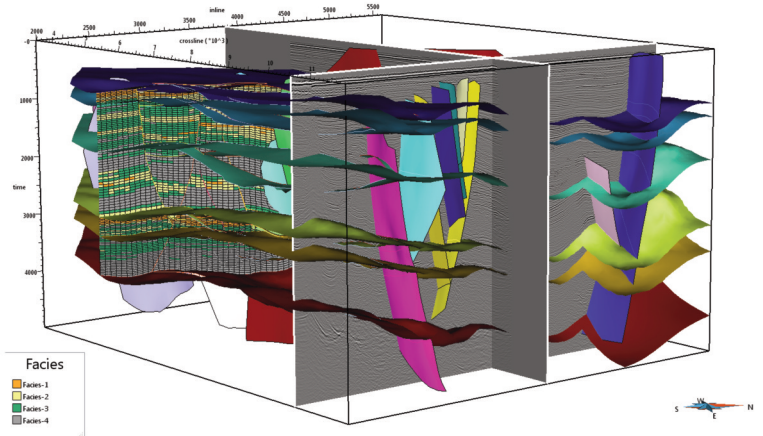
Altogether it aims at reducing modelling times from "months to days," he says.

SKUA builds on Paradigm's GOCAD software, which is widely used in the industry. It adds the UVT Transform capability, automated horizon picking and full uncertainty modelling. "All of these elements were not in GOCAD," Mr Chakrabarti says.

Working in collaboration

Many subsurface professionals are more comfortable working in isolation, so it can be hard to make the switch to collaborative working on the subsurface, Mr Chakrabarti says.

"When implementing this, as always, the most significant challenge has been organisational," he says. "People are not used to working in that manner. In some cases, you need folks with a whole new perspective to finally



SKUA enables geoscientists to properly represent the subsurface without simplifying any of the data

bring that into the workflow."

The software is able to support collaborative work because of the way Paradigm data is structured, with an underlying data infrastructure system called "Epos".

You can also work on it remotely, if you have a reasonably fast broadband connection (eg 10 mbps).

Well log data

SKUA makes it easier to incorporate well log data in your subsurface models, something which is becoming increasingly difficult as the amount of well data increases. "People have more well data than they are able to digest and use in their models," Mr Chakrabarti says.

Well data is very important for modelling because it is the only information from the subsurface that you can be sure about, he says.

"If you have very little well data, you're effectively peanut buttering that little bit of information across the vast areal extent of your model. You're saying, 'I've got a well bore - 18 inches of ground truth, and I'll spread that like peanut butter across tens of kilometers,'" he says.

"But if you have data from many wells, you say, 'Well 1 looks like this, the information with Well 2 has shifted, what does that mean for the ground in between?'" he says. "It lets you add information properties in a much more intelligent manner."