

Tear down the silos

True data integration has everyone talking the same language.

Rhonda Duey and Tayvis Dunnahoe, Senior Editors

Ever since the concept of the “asset team” first took root in the oil and gas industry, personnel from different disciplines have been forced to talk to one another and work together collaboratively on projects. It has not always been easy.

One of the primary stumbling blocks has been timing. It takes a long time to acquire, process, and interpret seismic data, whereas drilling engineers are often making on-the-spot decisions as they steer their wells. They do not have the luxury of time to go back to the drawing board and reiterate their models.

Landmark’s DecisionSpace Desktop aims to solve that problem. Launched in 2010, it has recently been updated with a well planning module that can do in minutes what used to take months. The deceptively simple user interface is backed by the brainpower of dozens of scientists who have been intimately involved in the system development, what Landmark refers to as “High Science Simplified.”

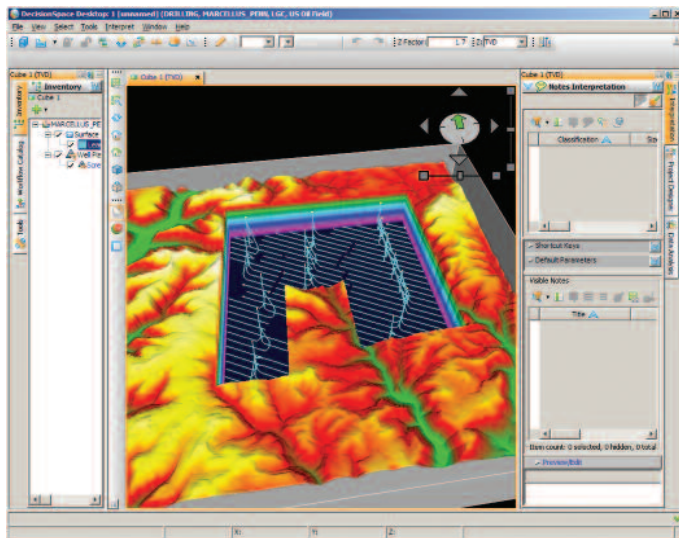
Simplifying science

“High Science Simplified is not really a process; it’s our commitment to what we deliver,” said Nick Purday, director of geosciences and reservoir technologies for Landmark. “We embed high science in the technology and present it in an easy-to-use, accessible manner.”

This has been achieved by incorporating domain specialists who know what customers want out of their technology. “Historically the industry has had great technology that is inaccessible because it’s only for the specialists, it’s difficult to use, and therefore it’s locked up with a few people,” Purday said. “With DecisionSpace Desktop, the usability is high, and the underlying technology has fantastic science. We’re embedding the knowledge and experience of 25- and 30-year experts so that somebody coming along today doesn’t have to take the seven- to 10-year learning curve like they did 30 years ago.

“Somebody coming in today can pick this up and be productive and offer value to companies very quickly.”

Part of this ability to learn quickly comes from a feature that allows users to capture workflows and knowledge. As users work through their data, the system establishes a workflow that can be monitored and documented. “If your boss walks in and says, ‘What have you been doing for



Both 2-D and 3-D views of multiflateral well plans in an unconventional field are shown in relation to the surface topography using satellite imagery and the subsurface reservoir based on horizon interpretation. (Images courtesy of Landmark)

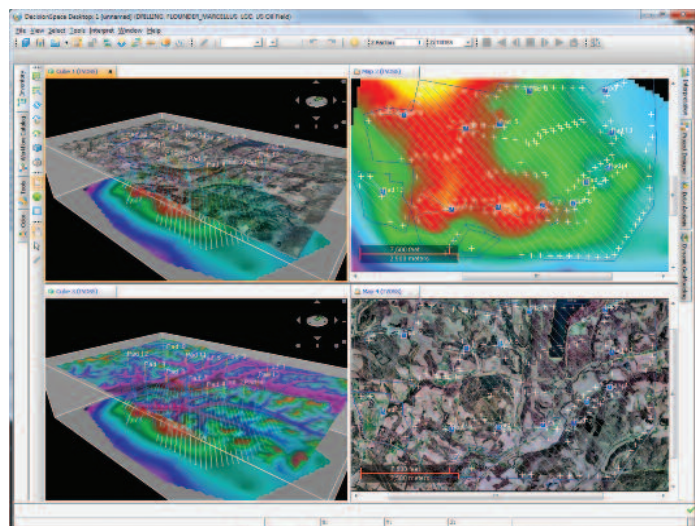
me today?’ here’s that information,” said Purday.

He added that originally Landmark’s geophysical and geological products were integrated at a data level. The new product is integrated at an application level – one environment that spans all of those disciplines. The DecisionSpace Desktop workspace is the entire system and provides the unified workspace where multiple data sources can be interpreted and analyzed in a collaborative manner.

Two types of data that are not traditionally employed in geoscience interpretation software but are integral to this system are GIS data and geological cross-sections. The software can bring geographic and cartography information straight from the ESRI ArcGIS database into the interpretation environment. This helps correct for mismatches between different types of maps. The GIS images are handled by OpenWorks, Landmark’s database, so there is no concern about which copy of the data is being used.

Geological cross-sections can be imaged in three dimensions, and interpretations can be done on these cross-sections. “If you had no seismic data, you could still do an interpretation,” said Purday. “We’re trying to take the non-digital and make it digital.”

The end result of the original offering is what Landmark calls a “Dynamic FrameWorks to Fill.” “That means



Both 2-D and 3-D views of GIS data in the DecisionSpace Desktop include 2-D lines, lease blocks, vertical images, satellite imagery, pipelines, etc. The GIS data have been draped on a key geologic marker, enabling accurate analysis of the block boundaries and tectonic elements on subsurface prospects.

that the interpretation is consistent, it's sealed together into a topological model – a live model that we'll update as we add interpretation," he explained.

The system can be updated on the fly and scales easily from a well scale to a full basin scale. "That's no small thing," said Gene Minnich, vice president of Landmark. "To take the vertical resolution of wells, for which you have very good detail, and extend it with seismic, to make that interpretation automatic – it's a big differentiator."

Well planning

The 3-D FrameWork-based system is optimized for geosteering – new information encountered while drilling can be updated in the model immediately. In geosteering applications, rapid updates are critical.

"Usually FrameWork updates would take a couple of days," Purday said. "With the DecisionSpace Desktop, you can now model, look ahead, and feel confident that you'll stay in the zone."

Added Minnich, "If you leverage information in real time so you don't have to stop operations to help make adjustments in performance or optimization, and if you're measuring information in real time and sending that back to update your models, you have an opportunity to redirect the operations."

New additions include the ability to do petrophysical interpretation on well logs. For instance, a log calculator recently has been added that links directly to the environment. "With this system, we've built a calculator directly into the desktop so that the geologists can complete the

log analysis in real time," he said, adding that the calculations are industry-standard computations for things like porosity, permeability, and water saturation but can be custom-tailored for each company's preferences.

The system also allows for the use of images of paper log sections such as raster logs, very common for onshore plays in mature basins.

This well-based information is combined with geophysical data to populate the reservoir model with attributes. For instance, users can look at the porosity within the reservoir that has been computed by the log calculator in three dimensions. This helps to validate the property distribution with the geological interpretation.

The next step is to start planning the wells. The drilling engineer is brought in to help plan the wells with the interpreters, who have already identified sweet spots from the attribute distributions. The geologist picks the targets, and the drilling engineer provides parameters of what can actually be drilled with the rig on hand. When the wells are displayed in the red-line section view, it is easy to see if any of the drilling parameters have been exceeded. If so, the well path can be dragged around until it meets the parameters.

Based on the well plan, the system also can predict the total development cost, and it factors in surface issues that could affect the placement of a pad or platform. And through microseismic monitoring of hydraulic fracturing jobs, field development plans can be changed on the fly to stay perpendicular to the fractures, which may be propagating in directions that were not predicted prior to completing the well.

Based on all of this information, current and future frac jobs can be planned to better optimize completions within the field.

In all, the goal is to provide actionable information in a reasonable time frame to enable efficient decision-making. "We need to integrate as much as possible," Purday said. "It's been a slow process, and our customers have been telling us it's a slow process. They wanted to plan out these fields, and they wanted to get through multiple scenarios. But they couldn't. Bringing well planning into the geosciences environment was one of those processes that was ripe for integration."

Added Minnich, "Even though people recognize the challenge, it's taken a long time for the cultural change to occur. Part of it is enabling technologies that get people into a room together collaborating on the same datasets." **ESP**