

## Human Skill Still Key To Interpretation

By Corine Prieto

HOUSTON- Today's unsurpassed utilization of computers and visualization techniques has been accompanied by an over-reliance on quantitative analysis at the expense of a more thoughtful and intuitive examination of multi-disciplinary issues in our daily lives. Artificial intelligence is still, after all, artificial. The human element—insight and intuition—is still excluded in the processing and analysis, despite the degree of sophistication of hardware, or for that matter, software programs.

Perhaps the greatest impact brought to bear by the onslaught of today's new technology hits the skilled geophysical interpreter, inundated by new data, hardware and software. Each advance is promising much, and in some cases, delivering more. This leads to a need for more complex, more interdependent and ultimately more skilled knowledge of both input and output.

Even with the best data and technology at hand, the reality remains that the oil and gas industry has to interpret information from disparate sciences in order to reduce risk and maximize drilling success.

### Full-Bore Acquisition

Over the past two years, the industry has had every available seismic crew and vessel gathering two- and three-dimensional data. Seismic land crews worldwide are booked for the next 12 months, high-resolution aeromagnetic companies have every plane in the air, marine and land gravity acquisition contractors have more meters in operation than ever before, and aerogravity contractors are requiring a six-month lead time for new

surveys. This is the latest daily news about acquisition today. The data are arriving in unprecedented volumes with even higher resolution.

The technology explosion continues in the area of new applications. Some of these, multi-beam bathymetry, gravity gradiometry, and marine magnetotellurics data for example, are now being tested and evaluated as to their contribution to the exploration scheme.

One must not forget software and hardware technology. In recent years, it has changed the data evaluation process. Depth imaging techniques and 3-D visualization matched with high-speed optimization and neural networks have entered into production mode within the exploration operations of most companies. These procedures are at the point where they have been fine-tuned and are functional, and E&P companies no longer consider them research items.

### The Reality Check

I am going to declare that 1998 is when "it" happens; this is the year reality hits. For the past eight years, industry has been developing record-breaking technology—in acquisition, processing and interpretation techniques. Over the last couple years, all anyone could read about was the collection of enormous volumes of high-resolution seismic data, and the processing of that data with state-of-the-art hardware and software. Here comes the reality check: Technology is ineffective without the skilled interpreter.

Outside the energy industry, such as in the financial community, there is an awareness of the importance of interpretation. For example, Jim Wicklund, the managing director of Dain Rauscher's Dallas office, was quoted in *AAPG Explorer* saying, "Adaptation (of data) is

the key concern—not technology itself, but using it efficiently and effectively and having it fully diffused through an organization."

The industry is headed back to the basics . . . back to interpretation. Take for example four-dimensional (time-lapse) seismic, yesterday's 2-D, and today's 3-D, now the state of the art, the last word in processing and imagery—or is it? The interpreter must still be in the loop, identifying horizons, discerning the cause for non-reflective zones, determining the salt configurations for pre- and post-stack depth migration techniques, solving fault shadow problems, and evaluating the intricacies of multiple data sets for the integration scheme. At least at the present, only human talent can assemble all the resultant data from technology-driven processes to determine if there is a prospect in the neighborhood.

Much like earth modeling or other forms of 2-D/3-D structural modeling, which have become a standard in depth prediction, today's technology demands the skills of an expert interpreter who can fully maximize the integration of multiple sciences required for an effective analysis. The skilled interpreter remains uniquely qualified to assess the unique sensitivity of geophysical and geological modeling to the parameters imposed.

Despite the obvious advantages of these new technological advances, even greater pressures have been brought to bear on exploration companies to recruit the technical staff necessary to meet exploration objectives. Manpower shortages in key areas have become commonplace. This is further complicated in the case of the skilled geophysicist by an over-reliance by geophysicists, as well as the industry at large, on the quantitative aspects



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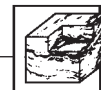
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of interpretation. We have started to accept that high-end technological advances do not inherently develop oil and gas prospects. The reality check has, in fact, already started.

## The Skilled Interpreter

But how does one separate the skilled interpreter from every other geophysicist on the block—or, more appropriately, on the workstation assembly line—each toiling knee-deep in multi-dimensional sciences, images, and computer-generated analysis? The need for trained interpreters is greater now than ever before for the simple reason that data integration is paramount. Despite the explosion of new technology, artificial intelligence and neural networks have not been able to duplicate the initiative, instinctive abilities and judgement of the experienced interpreter.

The skilled interpreters I have known and worked with possess a blend of multiple talents. The best is synonymous with the most effective. They have sound technical understanding of their science and the creative mind of an artist. They de-

rive from the geophysics a suite of numbers, and then proceed with the creative skills to formulate those numbers into a geological concept.

The realization that a skilled interpreter is not only a scientist, but also a bit of an artist, is new. The industry has never described its talent force in such terms. Or is this what Weeks or Halbouty had in mind, when one of them said that “oil was found in the mind?” This combination of characteristics is now being repeated and discussed often. I have heard references to it in corporate hallways and partners meetings. The unique combinations of talent to understand the intricacies of multiple data sets and generate prospects—that is, the capability to analyze sets of numbers and visualize sound geologic structures has come to the forefront.

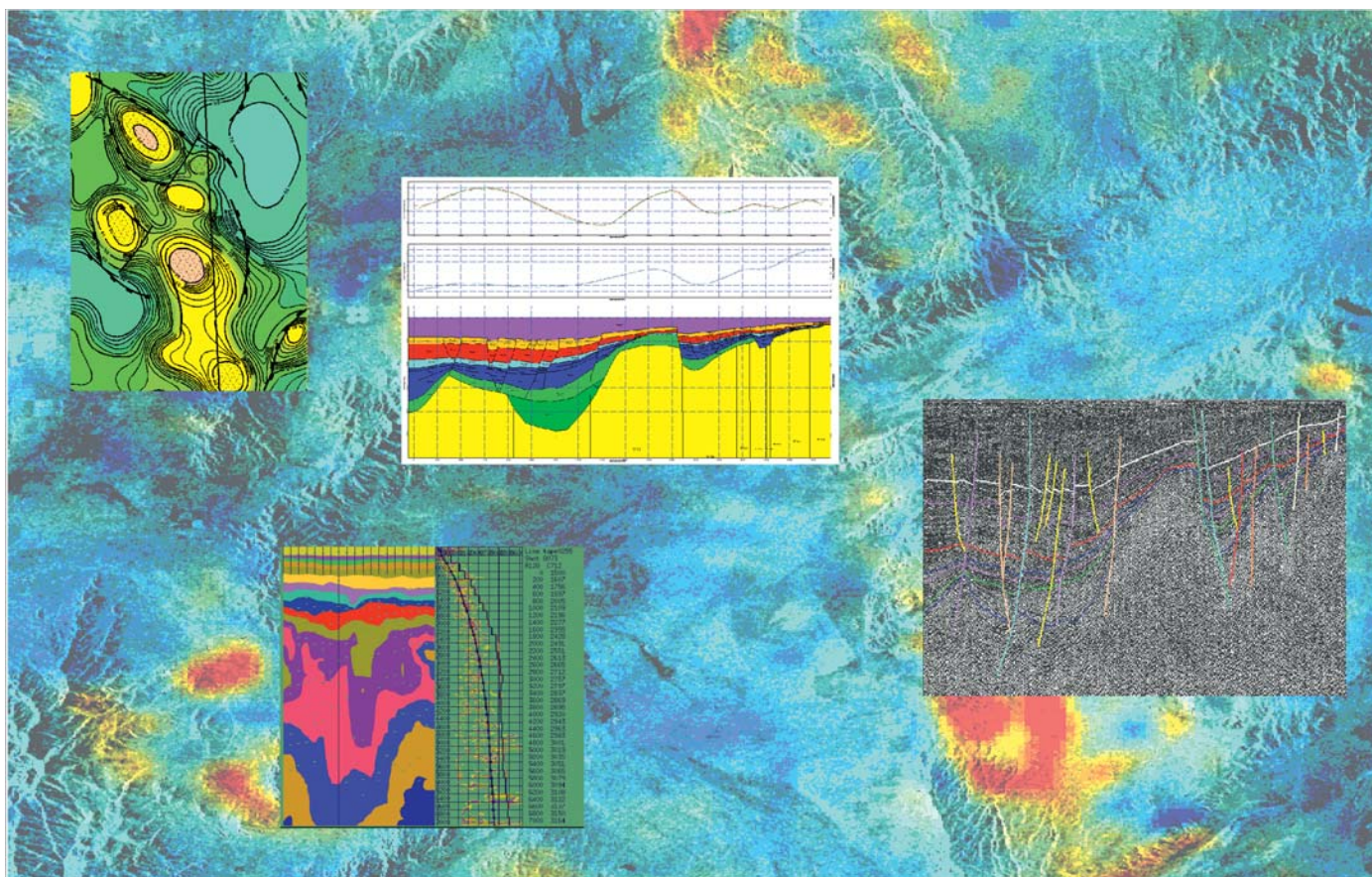
## Experience Is Key

How does an exploration manager identify the skilled interpreter? How does he determine which interpreter is rooted in his science, on line with the

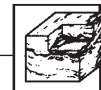
newest technology, yet possesses a profound appreciation of the integrity of data and the art of analysis? Whether it is for in-house or out-of-house expertise, the answer is very simple, requiring only a single adjective: experience.

There are a few identifying attributes. The first has to be education. Interpretation is not a simple art, mainly because it is bounded by science. Therefore, one has to be trained in sound theoretical techniques. The best interpreters (those who are “oily to the elbows”) are applied scientists. Basic geophysics, geology and mathematics are essential. But what cannot be taught at any of the top institutions or universities is instinct and intuition. For that reason, experience is crucial.

Now I am describing a prospect generator, an individual who finds the hydrocarbons. The best explorationists have worked with a significant volume of data. It takes time to gain experience. It generally takes a minimum of eight years to develop skills in pattern recognition, such as wave form and amplitude pattern combinations, or anomaly frequency patterns



At least so far, artificial intelligence has not yet been able to replicate the instinct and intuition of a skilled geophysical interpreter—one with the necessary technical skills to analyze multiple data sets as well as a creative flair to generate potential prospects.



that match a previous prospect that resulted in an earlier discovery.

A word should be given as to where experience is gained. Major oil companies or successful independent companies can both be excellent environments to obtain the best formal training. Because of access to the volumes of varied data in type and geographical location, these environments are conducive to honing that creative/artistic characteristic. The creativity potential is probably something one is born with, but the prospector's eye has to be developed. Practice can make perfect.

When searching for a geophysicist with skills as an oil tinker, one should note how he approaches a problem. Does he even see the geologic problem? There are many geophysicists that merely process data in the hope that something will tumble out. The skilled geophysicist understands how he gathered the data, what has happened to the data in processing, searches for patterns that indicate a trap, can verify the trap with information from other sciences, and knows how to display his target.

### Interpretation Integrity

It is also important to test his integrity in some way. The skilled interpreter is honest with data. Data should not be "twisted" or manipulated in order to build or destroy a prospect. It takes integrity to present honest results. One retired Exxon supervisor had it right when he

said, "Interpretation integrity demands not only that the interpreter recognize the objective/subjective aspects and non-uniqueness of an interpretation product, but that the client be made aware of those factors." The only real way to test this all-important aspect is by what precedes the interpreter: his reputation.

The final attribute that needs to be mentioned is the risk-taker factor. The best skilled interpreters are always willing to stand and defend their interpretations until the drill bit proves them right or wrong. I do not believe any interpreter would so staunchly defend his interpretation unless he was certain he had evaluated all the data subtleties and knew the interpretation would withstand scrutiny from peer reviews. That kind of confidence is an honorable characteristic. Perhaps it is the last trace of the wildcatter in this day of modern technology.

The final marker is the comfort or confidence level an interpreter generates with co-workers and management. This is where a manager's instincts and recognition skills have to come into play.

The bottom line is that today's unprecedented advances in data collection and software still do not guarantee drilling success. More than ever, the unique talent of the skilled interpreter, whether in house or as an external consultant, is the key to finding oil and gas. The human element is still the deciding variable with integrated interpretations, which have become a necessity in reducing the risk

factor. To derive the most from the exploration dollar, management must choose the interpreter who has demonstrated his expertise as both an artist and as a scientist; the geophysicist who will ultimately bring added value to an exploration team. □



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