FOCUS ARTICLE
Coordinated by Jason Noble

The Future of Interpretation Software

Doug Paul
Zokero Seisware, Calgary, Canada

Introduction

The Canadian oil and gas industry has changed significantly over the last ten years. Soaring hydrocarbon prices combined with the emergence of trusts and small exploration companies have changed the landscape of the energy sector. As the petroleum industry becomes even more competitive, a premium is placed on the explorationist to utilize all available data in as short a time frame as possible in order to evaluate properties, minimize risk, and generate drilling locations. Interpretation software plays an important role in achieving these goals. In order to understand the future of interpretation software, we must first understand its evolution and the industry trends that will affect its future direction.

History of Seismic Interpretation Software

In the early days when computers were dominated by giant mainframes the only interpretation software available was proprietary in-house systems. Computers were slow, but if you required additional functionality you could interact with the programming group and have it implemented. Due to the high cost of computers, however, access to interpretation software was limited to geoscientists working for the majors.

As computers got smaller and cheaper, Unix workstations began to dominate the industry making interpretation software available to a much wider audience. Subsequently, this led to the domination of interpretation software by a few large companies commercially marketing their own proprietary systems. As the dominant vendors began to prosper, many of the major oil companies dismantled their in-house software operations. As a result, more people had access to software but the ability to directly affect the creation of the software was significantly reduced. Interpreters were now at the mercy of the vendors. In this new and emerging market, these vendors' objective was to dominate each client company's software with their proprietary systems and not just the seismic interpretation component but processing, mapping, and geologic interpretation etc.

All vendors offered software in purchase / maintenance models with a large upfront cost followed by an annual 15-20% maintenance which provided software updates and support. New functionality was delivered in modules with each new module having an initial price tag followed by annual maintenance.

While the industry was largely driven by seismic interpretation, niche products became available for non-mainstream interpretation areas such as basin modeling, AVO analysis, inversion, geostatistics, modeling, and fault seal analysis. These boutique products were again sold at a premium almost entirely to large energy companies and built upon existing interpretation systems. Most vendors seemed to put their efforts into developing new products which could be sold into existing installations rather than enhancing and supporting the products for which they were collecting significant maintenance.

Unix systems were evolving as well and graphically demanding 3D visualization became generally available. As Unix systems became more powerful and cheaper, new seismic interpretation software was developed and offered to the market at much lower prices than the established vendors. Not only was the software less expensive, it provided functionality largely ignored by the 3D centric established vendors.

The next phase was the rise of the PC. Prices came down even further and the machines continued to get faster. Niche vendors started to emerge who undercut the price of the traditional vendors. The low cost of PCs allowed a proliferation of software vendors. At the same time the ubiquity of the PC created a community of geophysicists who were increasingly computer savvy. The development of high quality business applications raised the expectations of the average computer user. Interpretation software was now expected to be intuitive and easy to use. Increasingly the traditional vendors' software was looking awkward and dated.

Exploration Environment Trends

Rising energy prices have made previously uneconomic and marginally economic plays extremely viable. More emphasis is being placed on exploitation rather than pure exploration thereby allowing smaller exploration companies to become very profitable. Smaller companies with strong expertise in specific play types have surfaced and are able to be extremely successful in developing smaller plays not deemed worthwhile by companies with larger overhead. For the interpreter to effectively exploit these smaller play types, more data is required in comparison to traditional prospects.

More data is available to the explorationist now than ever before from seismic and geologic realms. Subtle stratigraphic plays are becoming much more commonplace requiring analysis techniques beyond those necessary to identify regional porosity closures. Improved seismic acquisition and processing techniques have provided geoscientists the ability to delineate many stratigraphic features once considered beyond seismic resolution. The increased availability of offset, multi component, and gather seismic data has allowed smaller companies to now utilize the same data that was once only in the realm of the majors. Subsequently, smaller niche software vendors have developed applications to better interpret what these data types reveal.

The business environment in the energy sector has also changed significantly with mergers, acquisitions, and divestments becoming everyday events. As a result, interpreters are frequently changing companies and often having to learn new software in order to perform their duties. As data and technology availability have leveled the exploration playing field to some degree, smaller companies can be much more aggressive and readily compete in emerging international markets.

Continued on Page 27

Continued from Page 26

The Emerging Interpretation Environment

Data is becoming more readily available every day whether from corporate sources or data vendors. Interpretation software will become much more tightly linked to external data vendors and internal data stores. As an example, an interpreter working an area will be able to download the location of available seismic data directly from their interpretation map view, select which lines they desire, and have them downloaded directly into their project. Well and culture data will be similarly accessed. Data volumes will also grow significantly. 3D surveys will grow larger and larger but more importantly many more versions will be available in day to day interpretation: AVO angle stacks and derived volumes such as gradient, intercept, and fluid factor; P and S wave volumes for lithologic identification; gathers and prestack data in general.

As technology improves our understanding of the true shape of the earth's surface with respect to spheroids and datums, all interpretation software will need to understand and properly transform locational data from any projected or geographic coordinate system. All field data will be acquired in NAD83 and all regulatory reporting will be done in this fashion.

As play types in the majority of the sedimentary basin become more subtle and stratigraphic in nature, integration with geology and engineering data becomes even more indispensable in delineating complex reservoirs. Easy access to log, pressure, and production data coupled with integration of depositional and reservoir models will prove essential for success. Integrating these data types in an efficient and effective manner will differentiate software vendors. Making this data available in a streamlined workflow that reduces cycle time and risk will be of paramount importance to explorationists.

Formerly specialized applications and processing such as coherence, attribute analysis, and cross plotting will become core tools in the analysis of subtle prospects. Inversion and multi-component analysis will provide interpreters a much better understanding of lateral lithologic variation from seismic data around their well control.

Progressive vendors are now offering interpretation software on annual subscription basis including enhancements and support. This puts the onus on the vendor to keep clients satisfied with respect to content and support or risk losing business. This model also promotes the involvement of the interpreter in the development process to a much larger degree.

More important than the specific functionality within interpretation software, is the efficiency and accuracy with which it provides an effective solution from start to finish. Regardless of how flashy and cool some functionality might be, if it is difficult and time consuming to get data into, or if the technology is unusable to the average geoscientist, is the value not compromised? In this new competitive environment, those who can analyze and interpret more data more easily will have a distinct advantage. Interpretation software that is easy to get data in and out of and intuitive to use will make explorationists and their companies more productive in the future.

The Future of Interpretation Software

The rise of the internet in the last few years has greatly changed the expectations of the user community. People increasingly have access to any information they want with a few mouse clicks. This trend has not fully transferred to the energy industry yet, but it soon will as users demand it. Geoscientists will expect to be able to retrieve any data they require from any vendor almost instantaneously, as well as accessing live data from the field. Interpreters will not be content to be locked into proprietary systems since they will want to choose their data and applications from the best source possible. This will help to drive the development of standards to facilitate data integration.

Standards have played a large role making data more accessible. It is not just the effects of data standards such as SEGY and LAS, but computing standards such as common file formats and API's as well. Standards permit data to be easily accessed from data stores shared among applications thereby facilitating faster cycle times for prospect development. Standards will continue to solidify as data and application vendors receive pressure from their clients.

Interpreters have also become accustomed to searching the net in order to get their jobs done. This trend will start to infuse seismic interpretation software as well. Users will no longer be content to hobble along with the software of a single vendor. They will want to use the best possible software for any individual task. This will foster a best of breed concept among software developers. Software systems will need to be more open, and easier to use, the users will demand it! Software vendors who cannot keep up with the trends will be left behind.

The net will also fuel the ability to get services online. Users will begin to expect that they can reprocess their data without having to leave their desks. The ability to access online algorithms and other services for a fee will start to become a reality. Energy companies and vendors alike will be able to license proprietary algorithms commercially via the internet. Successful interpretation projects may also be made commercially internet available allowing interpreters to analyze real analogous plays in a manner similar to purchasing regional 3rd party geologic studies.

The growth in the speed of computers seems to be slowing, but that won't affect any of this vision. The technology exists today for all these things to be possible. Multi core CPU's, terabytes of disk, and many gigabytes of RAM are seldom a constraint. It is just a matter of the industry developing the infrastructure in order to catch up to the trends.

Interpreters need to demand these things from vendors. As cycle times become shorter the users will absolutely require these things to happen. The quicker the industry recognizes these trends, the better. In the future software vendors will exist to serve the interpreter, not to dictate how they should do their job. Control needs to be put back into the hands of the interpreter where it belongs.

Data is power and interpretation software is the vehicle to harness that power. Successful interpretation systems will be technologically sound but most importantly be open, easy to use, and intuitive. They will need to be in order to meet interpreters' ever changing needs.