

<b>O7-5</b>	<b>INNOVATIVE AND NEW PHILOSOPHIES IN SEISMIC EXPLORATION</b>
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### **The Change of Management Philosophies**

The sustained low price of the oil has changed the management philosophies of oil industry. Oil and geophysical companies have been adopting new and innovative management and structural systems in order to manage resources efficiently.

Management philosophies of the organisations are being changed internally as well as externally.

Internally, management philosophies are shifting from the old traditional hierarchical to decentralisation or matrix forms. Such organisation enhances the process of decision making, provides operation flexibility and allows coping swiftly with the change in the market place. The management team consults and facilitates rather than controls and directs. Many organisations have developed business and asset units and pushed a lot of authority and accountability to lower levels.

Externally, more radical changes are made in form of mergers, takeovers and joint ventures. Such activities reduce cost, produce stronger and wider range of choices for investment, technology and expertise.

### **Information Technology**

Historically, our industry has been driven by technology. New technologies arrive on the science in waves. The technology development cycle is well known. It starts slowly by the innovators who test and evaluate the new technology. Once accepted, a rapid implementation follows which lead to maximum benefits to the developers as well as to the users. The new technology may become obsolete or it is replaced by a newer technology.

Examples of the technology waves in our geophysical industry follow:

1950- the introduction of analogue systems

Late 1950- the introduction of computers

Mid 1960- the digital recording replaced the analogue systems

1970-the bright spot, and the inversion techniques

Mid 1980- introduction of the innovate 3D and its related technologies

The cycle in new technology, from inception to maturity, is being reduced. Traditionally, technology information is handed to the costumer. This supplier (vender)/costumer relationship won't work any more. A shift of this strategy is that the supplier informs the customer of what is he doing in R & D. in addition, the customer informs the supplier of his need. This new philosophy guarantees that rapid advancement in technology. It fits the continually changing needs of the industry.

### **The Role of 3-D**

One of the new technologies, which are having a profound impact on our industry, is seismic 3D. the change from 2D to 3D improves our vision of the subsurface as such a binocular vision is an improvement over monocular vision. 3D seismic surveys and its related technologies have improved resolution and contributed effectively fewer dry wells.

We anticipate more innovative technologies to emerge in the domains of 3D seismic data acquisition, processing and interpretation. It has been predicted that the 2D technologies will be obsolete by the turn of the century.

### **Innovation in Seismic Data Acquisition**

We have witnessed the evolution of seismic instruments from analogue to digital, from 12 channels to 1000 channels, from single source and single streamer to multi source and multi streamer. We envisage more innovation in seismic systems. Systems that are affordable, light weight, canable of many thousand channels and works in wide range of environments. Currently the land seismic source, vibroseis, is

equipped with GPS. This may be extended to the receiver. It is conceivable that the industry come up with disposable land receivers, as long as they are not harmful to the environment.

Field techniques are being innovated for high production and less cost. Marine acquisition costs have declined significantly. Production of land surveys has increased dramatically by employing the vibroseis flip-flop, slip sweep and simultaneous recording. However, the costs of land surveys are still high and need to be reduced.

Another innovation is the introduction of 4D surveys, time laps, which is essential for reservoir monitoring.

We anticipate more developments in 3D, 3C surveys, which will help the explorationists to identify the physical properties of rocks.

### **Innovation in Seismic Data Processing**

What are the emerging innovative technologies of today that will significantly change the way we process the data?

Prestack depth migration showed that migration is developed to reveal subsalt discoveries. Specialized processing of 3D AVO has and will have an important impact on gas discoveries. The technology has some limitations, which we need to overcome. We have seen more technological developments to extract high frequencies, particularly for deep data, more defined seismic attributes. We envisage technical advances to reveal fracture and fault seal detection.

Onboard data processing during 3D marine surveys is a hot topic. It shaves months off turnaround time. Data transmission during surveys via satellite is another hot issue and it will be further pursued.

### **Innovation in Seismic Data Interpretation**

With the introduction of the workstation, the interpreter's burden of interpreting from paper and colour pencils has gone. The workstation provides the interpreter the power of accessing and moving large amount of data quickly, assembling and manipulating the display.

The workstation allows the user to interpret intellectually. Processing software packages are integrated with the interpretation software packages, which allow the user to reprocess the data if needed.

A major changing philosophy in interpretation domain "integrated study" is rapidly evolving. Here we build a multi disciplinary teams, which share common information as well as technical and financial objectives. Information from geologists, geophysicist and reservoir engineers are shared to produce the "interacted solution"

### **Summary**

Our industry is depend and is actively involved in technology. Many of the cited technologies will mature and new technologies will emerge. The philosophy of testing and evaluating a new technology, before it goes to marketplace, interactively and efficiently with the customer is a profound philosophy.