

AN OPEN ADVANTAGE

JAN STELLINGWERFF, DGB EARTH SCIENCES,
THE NETHERLANDS, DISCUSSES THE
RISE OF OPEN SOURCE SOFTWARE IN
SEISMIC INTERPRETATION.



Whatever sector a person works in and whatever applications they have on their laptop and website, one can be pretty sure that some of the software is open source.

From the free software movement that caught on in the 1980s, later to be replaced with the term 'open source software', today it is big business. According to global analysts, IDC, open source software is now used by almost three-quarters of all organisations and, despite the fact that it is free of charge, IDC predicts that worldwide revenue relating to open source software is expected to reach US\$ 8.1 billion by 2013.

The internet browser Firefox and the Apache HTTP server, which played such a key role in the growth of the internet and is today's most popular HTTP server software used by over 55% of all websites, are two such examples of open source software.

No sector has escaped the emergence of open source with the oil and gas industry seeing a number of open source applications over the last few years. These include dGB's seismic interpretation software, OpendTect, a seismic processing system called Madagascar, GMT, an open source mapping package, and FreeUSP, a collection of seismic routines originally written by Amoco (now, of course, part of BP).

Yet, what are the key characteristics of open source software? Probably the most common definition of open source software comes from the Open Source Initiative, a US based organisation dedicating to promoting non-proprietary software, which says that open source software must meet a number of criteria, including the need for it to be freely redistributed, that the open source code be readily available, and that there must be no discrimination against the types of people or organisations who use it and how they do so.

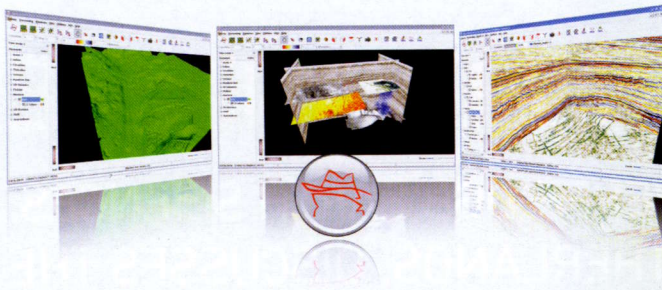


Figure 1. Horizon tracking, 3D visualisation and seismic attributes within OpendTect.

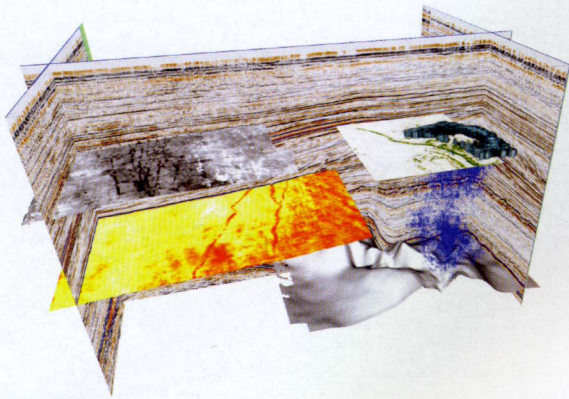


Figure 2. The 3D visualisation of attributes within OpendTect.

Linus Torvalds, a well known computer programmer best known for creating the Linux operating system, put it well when he said 'open source is a lot more fun than proprietary software and makes cooperation much easier. Like science, open source allows people to build on a solid base of previous knowledge.'

What is the catch?

Despite its perceived benefits and number of users, however, there is still scepticism in many industries, including oil and gas, towards open source. What is the catch? Why would any company give away their source code for free?

Consumers are often suspicious when they are given something for free or at a low cost. There is a general feeling that if it is free, little value can be subscribed to it and that even if the software tools include useful features, the software will probably fall down on the lack of training and support. All too often the consumer will, for 'peace of mind', go for the more expensive option.

However, few of these perceptions are the case in the oil and gas industry today, in particular in the areas of geology and geophysics and seismic interpretation. To explain further, it is necessary to take a step back and look at the challenges facing seismic interpretation today.

The challenges in seismic interpretation

Oil and gas operators today are facing a balancing act. They need to increase returns from exploration and production

activities, but they must do this against the backdrop of the need to manage costs and tackle fields of increasing geological complexity, where easy to find structural traps are a thing of the past.

There is increased pressure on seismic interpretation technologies that can be integrated seamlessly within existing workflows and can extract maximum value from the multiple volumes of often complex seismic and geological data that is generated.

While such seismic interpretation technologies have increased dramatically over the last few years in developing geologically consistent 3D representations of the subsurface and in technologies such as attribute analysis, which are very important in revealing geological information that may remain otherwise hidden, obstacles still remained.

This included the lack of integration between different software applications, the lack of an open platform that supports multi-volume, interactive attribute analysis, and too little input from users in further developing new interpretation features.

It was against this backdrop that dGB developed its OpendTect seismic interpretation software in 2003.

Software development

OpendTect, which is free under the GNU GPL licence, is the only available open source seismic interpretation platform used in the oil and gas industry today. Since 1 September 2009, there have been over 30 000 downloads of the software, direct from the website.

While it is supplemented by a variety of commercial plugins related to specialist areas, such as sequence stratigraphy, fluid migration and rock property predictions, OpendTect contains all the features to provide the majority of geophysicists and seismic interpreters with all the tools they need to carry out highly sophisticated interpretation.

Take the issue of attribute analysis, for example. Since their introduction in the 1970s, attributes have come a long way and are today an integral part of the seismic interpretation process, prevalent at every stage of the exploration and production cycle from horizon tracking through to supporting advanced 4D interpretation. Recent developments have included 3D attribute extraction, cross plotting, multi-attribute analysis, and enhanced visualisation

As attribute analysis has advanced, so has the need for software that supports multi-volume and interactive analysis and brings with it new interpretation capabilities.

This is what has been done with the company's software, which has a powerful attribute engine providing sophisticated multi-volume, interactive analysis. Users can target and calculate attributes on the fly, test attribute parameters (frequency, time gate or step out) within a highly visual environment, and create their own attributes to find the optimal settings for their data.

Seismic filtering and processing capabilities are also supported with the open source software connected to the already mentioned open source seismic processing package Madagascar, with the processing flow builder enabling the user to construct and execute Madagascar processing jobs.

Much of what makes OpendTect today is due to the fact that it is open source. The Open Source Initiatives points to 'the power of distributed peer review and transparency of

process' as bringing real software benefits including 'better quality, higher reliability, more flexibility, and lower cost.'

Peer review process

The software is based around the concepts of openness and collaboration. By sharing the source code with commercial and academic institutions, dGB can ensure that, through this very broad test sample, OpendTect continues to be constantly tested and further developed.

Another benefit when opening up the software to the academic world is that it can bring graduates and future entrants into the oil and gas industry up to speed with the latest seismic interpretation techniques. At a time of considerable staff shortages and local workforce capacity building requirements in regions, such as Africa, this is a significant benefit and contribution to the industry.

To date, dGB has established relationships with over 180 universities worldwide dispensing over 1000 free licences. The list is truly global and includes 58 universities in Europe, 12 in the Middle East, 27 in Africa, 28 in Asia, 10 in the Asia Pacific region, and 43 in the Americas.

In addition, the company has also built up a database of seismic information for universities to work with. dGB's Open Seismic Repository contains seismic data, interpreted horizons and well data from a number of global locations, including Central Alaska, offshore Netherlands, and the North Atlantic Ocean, offshore Canada. Feedback from the universities has been very positive.

In June this year, dGB donated US\$ 4.8 million of software to 20 Nigerian universities as well as, of course, the free OpendTect licences. The announcement, made in partnership with local Nigerian oil and gas services provider, Danvic Concepts International, which has been co-ordinating the local roll-out, forms part of the Petroleum Technology Development Fund (PTDF), a Nigerian government initiative to enhance research and training within the country's oil and gas sector.

Commercial operators have also involved themselves in the peer review process. In addition some oilfield services companies have also taken the open source code of OpendTect and developed their own commercial plugins, which is something dGB actively encourages.

For example, UK based seismic geophysics specialists, ARKCLS has developed seismic spectral blueing and seismic coloured inversion plugins for the software as well as a workstation access plugin, which supports direct import and export from Landmark's SeisWorks/OpenWorks and Schlumberger's GeoFrame-IESX data stores.

This is an example of how another company is taking open source software and increasing its applicability across the seismic interpretation landscape, which is exactly what open source software is all about.

Training and support

Another misperception about open source is that users are on their own once they have downloaded the software, however this is not the case here. Detailed and user friendly training manuals are available and a 24 hour phone line is also available at no cost. For those who want more in-depth training, dGB offers paid for customised courses and three day training.



Figure 3. 41 students from 20 different universities in Nigeria being trained up on OpendTect.

It is in the company's interests to provide users with the training and tools they need to derive maximum benefits from the software. It is also a source of comfort for the user to know that the software they adopt is not dependent on the vendor's longevity. While dGB has no plans to go anywhere, having been in operation since 1995, open source software will survive whatever happens to the parent company.

An open source base system, unprotected by licensing software, is central to what OpendTect is all about. It enables accessibility and continuous testing and improvements, integration with existing workflows, and the fast track development of new and innovative interpretation tools. **OT**

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