The ability to effectively display, rapidly assess and dynamically experiment with multiple datasets has helped to reduce risk and increase prospecting capabilities in exploration. Increasingly, what’s required in exploration is software that can handle large volumes of data and multiple data sources and data types, such as geophysical data, geochemical data, drillhole data, satellite imagery, GIS data and any kind of mapping data, within one single environment or transparently linked environments. Utilizing today’s visualization tools, geoscientists are able to reduce risk and increase understanding by looking at as much different data as they can, in as many different ways as they can, within compressed project time frames.

Despite the fact that exploration companies are leaner, with fewer people and shorter project time frames, Dr Michal Ruder, principal of US-based Wintermoon Geotechnologies, says she has seen exponential improvements in productivity and data quality as a result of new software for mapping and visualization. Whereas it used to take weeks to process and interpret geoscience datasets, today it is not uncommon for geoscientists to address the salient issues of interpretations in the course of one or two days.

‘I can remember doing batch maps in paper copies back in the 1980s,’ says Dr Ruder. ‘Since then, the ability to image geoscientific datasets on a computer screen in real-time and continual improvements in visualization software have had an amazing impact on what we can do as geoscientists, and how quickly we can do it.’ Interpretation results are also more accurate because geoscientists have the tools to view the quality of the data in every single phase, from initial data processing and quality control through to visualization, integration and the final interpretations.

Dynamic and integrated visualization

Equipped with her laptop and mapping software, it’s not uncommon for Dr Ruder to do interpretations on-the-fly, in collaborative meetings with major oil and gas customers. ‘I can do a lot of work in my clients’ offices on my laptop,’ says Dr Ruder. ‘My mapping software enables a lot of interactivity and testing of their hypotheses, and I can show customers the results in real-time.’

There are efficiency and quality advantages in being able to dynamically pull customer data in, whether it’s well data, satellite imagery or other types of data, and to immediately look at it as part of the interpretation. The dynamic linking of multiple views of imagery, maps, profiles, plots and data also provides an easier point of reference for visually linking common features or areas of interest.

This type of rapid assessment and dynamic experimentation depends on the ability to interactively display, and enhance, different attributes in different ways, whether through contrast enhancement, shade relief, angle illumination, two dimensional or three dimensional displays. Speed in creating and recreating visualizations, or refreshment time, is also an important consideration, especially when dealing with large datasets.

Three dimensional modelling

The use of specialized three-dimensional modelling software for prospect modelling of salt bodies can further help to reduce risk in areas such as potential field exploration.

‘It’s very prudent to do 3D modelling for prospect model-
While geoscientists recognize that there’s a lot to gain by looking at different types of data, Dr Ruder admits that there is still a tendency within each discipline to use the data that they understand the best. ‘In general, I think people don’t realize how easy it is to integrate all of their datasets, whether it’s seismic and non-seismic, raster and vector.’

Targeting mineral exploration mapping needs
Mineral exploration projects can have upwards of five hundred drillholes. As exploration projects increase in size and the number of drillholes and other datasets increase, effective software has become essential for managing and visualizing these large datasets.

Major and junior exploration companies each bring their own unique and diverse perspective to the business of exploration. However, when it comes to mapping software, ‘We knew that what we needed was a good, computer-based means of archiving and visualizing our drillhole data,’ says Parker.

Parker has been using a mapping system for geophysics and geochemistry since 1990 and this past year African Eagle added drillhole software to its system. The ability to work efficiently with all the data in one integrated environment was a key consideration. ‘Our system provides a powerful way of viewing and visualizing the data,’ explains Parker, ‘and it allows you to combine different data sets, in different ways, to make the best use of all the data you have available.’

Visualization has played a critical role in African Eagle’s exploration projects. ‘In a situation where you don’t have any outcrop, which is typical in Tanzania, you’re relying very much on your drillholes to do basic geological mapping, as well as actual mineralization interpretation,’ says Parker. ‘In this case, it’s quite important that you have powerful tools for visualization which allow you to make the best use of the data you have and to interpret the data to the maximum.’

Integration with its Geographic Information System (GIS) environment has become a greater priority for African Eagle. In addition to meeting internal needs, GIS integration of data to be shared effectively with African Eagle’s major exploration partners.

Exploration projects often involve two or more companies working together within joint ventures, option agreements and other partnership arrangements. ‘As an example the partner on one of African Eagle’s Tanzania projects uses ArcView,’ explains Parker. ‘In working with them, we need to supply formats that can be viewed in ArcGIS. If we can supply things in native ArcGIS, so much the better.’ Parker sees the market introduction of Geosoft’s Target for ArcGIS, a drillhole and mapping extension for ESRI’s ArcGIS, as a positive step towards meeting its integration needs.

Exploring in GIS
Julian Misiewicz, consulting geologist for Africa and Europe with Gold Fields International, a South Africa-based major global gold producer, makes a distinction between essential and specialist-use mapping functionality. ‘In mineral exploration, you need three basics: database software, a GIS package, and, definitely, a drillhole processing package. All three are essential. Having met those needs, if cost is not a factor, specialized three dimensional modelling packages are also very beneficial.’

Efficiency in data processing is important, but ultimately the proof, and the power, is in seeing your data. ‘The better you can see and plot your data,’ says Misiewicz, ‘the better you are able to understand it, first, and the better you are able to get the best value out of that data, and to use it effectively throughout the business environment.’

For many years, specialized exploration software has provided the ability to expertly visualize geophysical, geochemical and geological data within an integrated environment. Visualization technology has come a long way. Advanced rendering techniques together with three-dimensional modelling applications have added a lot of power to...
the way data can be viewed and interpreted.

Until recently, however, visualization tools for exploration data in the GIS environment have been very limited. This is rapidly changing, as integration of exploration software with broad-based GIS systems takes greater priority in the industry. New exploration software is tasked with meeting the growing need for seamless integration of exploration datasets within the broad-based GIS environment, while continuing to meet the rigorous mapping and processing requirements of geological users.

At the end of the day, explorationists use computerized methods because it’s quicker and better than doing it by hand. Exploration drillhole and mapping software provides a key advantage by making it possible to handle large volumes of data and routinely visualize a thousand or more drillholes at a time. This enables geologists to create and revise maps and sections quickly and easily, while formulating and fine-tuning an understanding of their targets.