Abstract

The overview for this session refers to the fact that “geomodelling tools are far from perfect and may create a false impression of accuracy”. The focus of this presentation will be to show that whilst this statement is broadly correct, in some circumstances, a flexible approach to modelling using the most appropriate software tool for each task will lead to greater accuracy in the final geological model.

Inaccuracies are inevitable in a geological model. The rationale behind a geological model will to a large extent control the level of inaccuracies. For example, a geological model built to represent the detailed geometry of a fault zone will have a finer resolution than a field-scale model for input into a reservoir simulation, which in turn will have a greater level of detail than a geological model for a regional aquifer study. The acceptable level of inaccuracy is a clear decision that is made by the modeller and is directly related to the relevant resolution for the job in hand.

Unfortunately, during the modelling process a number of inaccuracies may creep into a model, which are beyond the control of the geomodeller. These arise from the fact that as part of many projects the geological modeller is forced to make decisions that produce inaccuracies as a result of inadequacies in a software package. These are frequently associated with the fact that the software being used is not appropriate for the task in hand. In the majority of cases such inaccuracies are not to do with the quality of the software package, merely the philosophy and/or fundamental approach to modelling of that package.

All too often, geomodellers are railroaded into using one particular software tool from the beginning to end of a project that is completely ineffective for the type of geological regime.

The result is that the modeller has to make decisions, against their own will, which diminish the overall quality of the geological model. A number of examples will be demonstrated, including:

- faults being simplified to create a good quality 3D grid;
- software that generates a good quality structural grid, but poor reservoir properties;
- uncertainty analysis being ignored because it’s difficult to create multiple versions of models;
- geological models created in cad packages that have little or no geological control;
• 3D interpretation in 2D packages;
• ineffective time/depth conversion, and
• well design.

It’s very easy to comment on the inadequacies of various software packages, however every product on the market, has a number of strengths, often unique to that package. The significance here is that when building a geological model one method of reducing inaccuracies is to acknowledge which software package is most appropriate for each particular task in the modelling process, and then to exploit that software package. This may require the use of a number of software packages during the construction of a geological model. The integration of a number of geological modelling software packages can enhance the accuracy of the final model by building on the strengths of a number of software packages.

There should be a note of caution here, namely that the geological modeller should not strive to over-complicate a workflow unless there is a distinct advantage to be gained. Therefore if a geological model can be constructed in one single package without any detriment to the desired accuracy, then that is probably the most appropriate workflow.

A multi-package approach to geomodelling does have issues from the point of view of vendors, the end-users, and also the companies that purchase the products.

Vendors need to recognise that in particular circumstances there are some aspects of their own software packages that can cause modelling inaccuracies. Consequently, it is necessary to understand that the users may benefit by integrating the best parts their package with other software packages. In order for this to happen it is essential that software vendors design modules to import and export models to and from one another more efficiently.

In terms of the users the application of multiple software packages does present other issues. In particular, it requires a higher degree of training, because the end-users will need to be proficient on a number of software packages.

From the perspective of companies there is a question of budget related to the software itself, training and the support of multiple software packages. The question here is whether enabling the end-user, the geomodeller, to decide the best approach for solving their problem has an economic benefit. In most cases the benefit would be that investment decisions will have a more technically sound basis.