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Expliciting what efficient team work should be in geomodeling projects

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Summary

What is making a geomodeling project succeed or fail?

Are we facing major problems with geomodeling software? Historically yes, as geomodeling started at a time when computers and everything related to them were in their infancy. Nowadays though, modern geomodeling software are both powerful and relatively easy to use. Are they perfect? No, but they are not the bottleneck they used to be, as long as O&G companies invest in the geomodeling modules they need.

Are we facing limits in the sciences behind geomodeling? While new scientific breakthroughs will continue to come, we already have a robust toolbox with techniques like implicit modeling, local geostatistics and uncertainty management.

Do our teams lake knowledge about all of software and the science behind them? Service companies provide numerous training on their software while science behind geomodeling can be learned at university, in professional courses or through the numerous books available. Here again, as long as O&G companies invest in training their teams, lake of geomodeling knowledge shoudn't be a problem.

If software, science and training are not really the issue, why do we continue facing problems in our geomodeling projects? The author believes that the answer is to be found in the way we integrate others' work into our geomodels. Our rather, in the too basic way in which we often integrate others' work, focusing on data integration rather than knowledge integration and efficient team work.

The integration of petrophysical logs is an example.

The workflow is often as follow:

- The petrophysicist conducts the petrophysical interpretation and, among other logs, he/she computes logs of vshale, porosity and water saturation (SW).
- These 3 logs are sent to the geomodeler in LAS format (for example) for the geomodeler to use them for modeling these 3 rock properties in 3D. This is the end of the collaboration between the geomodeler and the petrophysicist. Hereafter, I'm focusing on porosity modeling. Similar observations can be done on the other logs
- Through data analysis, the geomodeler defined the range of possible porosity (for example). The geomodeler might even spot some vertical trend in the porosity distribution. He/She might also spot some horizontal trend showing that the average porosity is different in different part of the lease.
- Multiple realizations are generated with geostatistical algorithms. All the realizations respect the porosity distribution and the vertical and horizontal trends spotted.
- One 3D model is sent to flow simulation after upscaling.
- The geomodeling work is complete

At first look, everything seems in order and a geomodel has been built by integration of the (petrophysical) data into the geomodel.

What might have been missed?

A longer discussion and review of the logs with the petrophysicist might have revealed that, while the correct petrophysical equations were applied, they were applied with slightly different values for some constants, from well to well. In particular, it would have become clear that the horizontal porosity trend from well to well was largely coming from slightly different values used for the “shale porosity” used in the equation to compute effective porosity from total porosity and vshale.

As a conclusion, the real horizontal porosity trend – if any even exists – is hidden behind these subtle changes in the petrophysical equations from well to well. Should new petrophysical logs be generated? Maybe. Should several versions of the logs be generated to capture the uncertainty in the petrophysical analysis? Maybe too.

But more importantly, what caused that this level of complexity in the logs got completely missed? Simply the lack of a real team work, a deeper collaboration than the one needed to transfer files efficient between the two experts.

Similar examples can be built around the interations (or lack of) between the geomodeler and the other specialists working around the geomodeling project:

- The geomodeler might discard any idea the geologist has about the reservoir just because he assumes that data analysis tools will arrive to the same – if not better – analysis of the reservoir.
- The geomodeler might rank his models based on in-place volumes and export the realization corresponding to the P50 volume. Without good communication with the simulation engineer, the geomodeler might miss that ranking models based on connectivity would have been inappropriate.
- The geomodeler might spend time running volumetrics to realize later that the reserve engineer will not use these numbers. By convention and by habit, he will prefer to use a simpler approach.
- And so on, and so on.

Beyond all these issues, the author seems the sign of a lack of good collaboration between the different experts. Good data transfer is not enough. We need people to really collaborate.

The author believes that such backbone of such collaboration can be defined by geomodelers for each type of collaboration. Like a guide one what type of information should be exchanged between the different experts.

The author hopes that this poster at the GeoConvention will raise interest among the participants and that some will be interested in sharing their own experience with poor team work and feed the author’s reflection on the subject.