It Ain't What You Do, It's The Way That You Do It: Decision-Led Modelling Workflows for Mature Fields

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Standard modelling workflows often let us down when it comes to supporting decisions in mature fields. The models tend to become large and unwieldy, the integration of production data is time-consuming and the incremental nature of the data accumulation means models tend to become 'patched'. Models are commonly passed hand-to-hand between practitioners to the point that ownership is lost. The update and maintenance of the 'field model' becomes a job in itself, often separate from the process of managing the mature field. The modelling process thus reaches a technical limit, and loses its value.

We argue that successful modelling and simulation in mature fields requires a different generic workflow, building on concepts of front-end loading and design, with much of the work and the thinking done before significant modelling work is undertaken. This goes significantly beyond the idea of holding a project framing session. We use the Forth Rail Bridge as an analogue, the cantilevers representing short periods of team-based working and the nodes between the cantilevers representing meeting points when the disciplines come together to compare findings and plan for the next work segment.

The generic content of each node and cantilever is predictable project-to-project:

- *Node 1* - problem definition ('frame')
- *Cantilever*- data review
- *Node* 2 - definition of uncertainties – the long list
- *Cantilever* - analysis of significant uncertainties – root cause analysis
- *Node* 3 – review result and short list
- *Cantilever* - initial static/dynamic models to test commercial sensitivity
- *Node* 4 - decision on modelling – worth it or not?
- *Cantilever* – the larger modelling exercise, or not

Work in the early cantilevers is short – measured in days or weeks. The early modelling choices are not known at the outset – the problem has to be defined, deconstructed and worked - and hence the study plan is *not* constructed at the kick-off (the 'framing'), as too little is known at this point,

even if individuals have worked on the field before. Previous experience may even be a limitation, as it brings bias and tends to result in model rebuilds which are simply updates of the past. The outcome of these initial steps may be that detailed full-field models are not required to support the decision at hand; potentially modelling is not required at all.

An example is given from a mature field in which standard modelling workflows proved incapable of delivering useful technical support for decision-making. Work commenced and it quickly became apparent that the static-dynamic iteration of a full-field model at the resolution needed to capture production behavior was too time-consuming to support the decision on infill drilling which the asset team was required to make. The technical limit of the default modelling process was reached. The initial, traditional modelling plan was therefore abandoned in favour of a multi-scale approach with static-dynamic iteration on small sectors combined with coarser full-field material balance and volumetric work. There was no 'field model' but a number of models, each addressing part of the problem. The decision-point was reached in time for the corporate planning cycle (just), was supported by the models and the wells have subsequently been drilled successfully. A traditional, detailed, history-matched full-field model was not required and was never built. The technical limit was overcome.