Seismic Interpretation to Reservoir

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3D modeling tools are now mature. At the opposite of former industrial practice where only 3D software experts where able to build 3D subsurface models, it is now time to give the geologists, geophysicists and reservoir engineers, user friendly tools. The primary goal of 3D modeling is to streamline the construction of reservoir models from interpretation data. This goal is achieved in Gocad by the introduction of workflows.

A workflow guides the user through a sequence of logical steps in order to perform a task in relation to the input data and modeling criteria. By definition, a workflow seems to be very similar to a wizard. However, there are some differences in the concept. A wizard is a linear decision tree whereas a workflow is a decision graph. A workflow provides to the user a higher level of freedom in the control of the modeling processes by defining, for example, cycles and loops.

Moreover, a workflow always presents a default path, which provides an automatic solution. Due to the complexity of the geology, the default solution may never be completely adapted. For this reason, a workflow must provide optional editing and a fast quality checking operation at any step in the modeling.

A workflow is also used to integrate only the most common operations to achieve a given task. Thus, the workflow may not be fully adapted for special cases due the complexity of the geology. In this kind of situation, the user may have access to basic gocad operations to handle those situations while staying in the same workflow.

The workflow is also responsible to maintain the consistency between the input and the output. If the input changes, the output should be regenerated automatically using a dependency mechanism.

A workflow will be based on command script language in order to provide customization functionality. It will be also possible to save at any time a workflow application and reload it exactly where the user left off.

To construct reservoir models from seismic interpretation, two different workflows have been created in Gocad:
- A "structural" workflow: The structural workflow builds a geologically consistent structural macro-model. It builds faults and horizons networks from a set of unstructured data and geological information. The structural macro-model is managed by structural model object. The structural model object includes faults and horizons, but more importantly it includes the relationships between those objects, and the information associated with the geological processes such as faulting. The output of the structural workflow is either a solid model or a set of well-prepared horizons and fault surfaces for the reservoir modeling workflow.
- A "faulted stratigraphic grid construction" workflow: The reservoir modeling workflow builds a reservoir geometry from the structural top and bottom and optionally the fault surfaces. The workflow focuses on setting up the information for

building the grid alignment, the pillar vectors and the stratigraphy. Once this information is computed many reservoir grid can be build. Grid alignment and pillar vector computation can rely on information provided by the structural workflow. If the information is not present, the workflow proposes some additional steps.

To conclude, a workflow is here to guide the user through a sequence of logical steps, to provide at any time during the modeling process, an access to an instant guideline information and to a generated modeling report. In a few words, a workflow:
- reduces the learning curve and the comprehension of the modeling processes,
- facilitates the communication between asset teams on different case studies by sharing the knowledge of the project quickly.