Today, geoscientists and engineers use a mix of different software applications to perform their work.

These various components can be part of a same integrated suite or come from different vendors.

Some of the functionalities will be very familiar while others are only used occasionally and can therefore be classified as unfamiliar.

When users are familiar with an application, they know how to navigate through menus or shortcuts. If they are experts at the use of the application, they will want to record and make use of their own macros to streamline repetitive tasks.

On the other hand, if they are not familiar with an application or are non-expert at the tasks at hand, they will have difficulty knowing where to find all the available options that may be necessary to successfully complete their work.

**Workflow – linear sequence**

To help tackle these two different ways of working, namely either being guided through or easily automate a series of actions, the software industry introduced the concept of workflows.

Two types of workflows are therefore needed to handle these two very distinct processes: workflows or macros created by users; and workflows created by the manufacturer or by expert users to help the “unfamiliar” user navigate through the application’s many options.

Generally speaking, the term workflow refers to a sequence of steps performed to accomplish a specific task.

**No linear component?**

However, if one considers for example the seismic interpretation task, it has for all practical purposes no linear component.

It uses a limited number of commands, repeated over and over for many hours and sometimes days.

In the past, there were specialized applications for doing interpretation only; menus in the user interface were therefore generally simple.

Nowadays, interpretation is often part of a bigger process and therefore includes many more options such as the validation of the interpretation and steps that go beyond traditional interpretation, e.g. prospect sanction or geological model construction.

It is also often part of integrated multidisciplinary “seismic to simulation” software application suite.

An interpretation “workflow” must therefore provide a focused environment by adjusting the graphical renderings and by grouping together the relevant options in such a way as to optimize the interpretation task.

Results of the interpretations and the decisions that led to these interpretations must be captured by the workflow.

A workflow therefore becomes a user interface component that physically groups options in a logical order and associates them to the steps that are effectively executed as well as to the data that is used, the decisions that are made, and the results that are obtained.

**From workflows to scenarios**

From an asset team point of view, geoscientists and engineers work on generating alternative exploration or development scenarios.

Each scenario may consist of a specific structural interpretation, a reservoir model, or a development strategy.

The scenario is the central concept around which practitioners organize their work and their decisions. The scenario must therefore also be a central concept around which the application organizes both input and output data for users.

Since a workflow is the way tasks are organized to generate interpretations and construct models, an instance of a workflow should be associated to a specific scenario. Furthermore, by attaching the results of these activities to the execution of the workflow, the results of the workflow are now linked to a scenario.

Under the assumption that every action is recorded as users advance through the workflow, activities and results are linked. All the results ensuing from the execution of a workflow (in the most generic sense) are then associated to a scenario.

Results can be objects (e.g. structural maps) or numbers (e.g. OOIP estimates) and the activities that created them are recorded. Given two scenarios (or two executions of the same workflow), users can investigate differences in output results and understand correlations with input parameters.

Workflow reports can be automatically generated detailing all the steps taken and containing all associated decisions and results as well as explanations of the methods and the parameters that were used.

A complete study generally corre-
Typically, a Service Oriented Architecture needs to be implemented and each application becomes a service provider. Data is passed from application to application as the workflow progresses. In our industry, initiatives such as WITSML, PRODML and RESQML are on track to provide the message data layer required in a SOA. The service definition, however, is much more difficult to tackle. Many approaches exist in optimization systems in which a reservoir flow simulator cohabits with a reservoir modeling software package. The messages passed between the applications are ad-hoc. For a more interpretable workflow, SOA architectures can be used to gather rather large chunks of functionalities, while "macros" and "plug-ins" bring additional technology and therefore additional workflow steps into existing applications.

**Conclusion**

Several goals can be accomplished using workflows: repeatability, ease-of-use, audit trails, and collaboration. They facilitate project and technology transfer and also provide training. Built-in workflows and user-defined workflows are two very important means of delivering efficient applications today. Practical inter-application workflows are still in a distant future.

Linking the concepts of scenarios and workflows at the software level enables the grouping of both activities and results in better auditing, bearing in mind that "the methods used to obtain the results are as important as the results themselves."