MO2Geo - move to geological modelling

A multidimensional, modular, open source, object-oriented geological modelling tool

Multidimensional

MO2Geo is going to store and treat field data, interpret, visualize, analyze and model geological data in several dimensions:
- At first the three spatial dimensions are meant (full volume 3D).
- Additionally, time has to be considered, because time plays an important role in geological processes (4D).
- Multidimensional datasets go beyond these obvious four dimensions by working with material data, concentrations etc. (nD)

Geological modelling tools as M02Geo should take Into account the geological processes with time dependent and spatially varying parameters.

Modular

M02Geo is planned to become a tool that consists of modules. These modules shall be able to save, visualize, analyze and model geological data. This shall be managed by a differentiation on several levels piled up modularly and being connected by defined interfaces. *Visualisation tools can* thus be used *for diverse* datasets and on different levels. The levels are constructed so that
- the lowest level (the core) is made up of a 4D description of the locality,
- the second level holds a description and interpretation of the data,
- the third level is reserved for static analysing methods and visualizations,
- the fourth level is at least reserved for modelling tools.

All models are gathered like shells around the field data as a core module. Core modules are used to save the spatial entities, e.g. points (OD, singular measurements), lines (ID and 1.5D, quasi-continuous data as logs or profiles), polygons (2D and 2.5D, e.g. geological maps or vertical cuts in quarries) and volumes (3D, e.g. from the geophysical exploration). These datasst go far beyond the needs of geographical datasets but it should be possible to connect them to a GIS, e.g. GRASS.

The second level should be used for the geological description and first interpretation, e.g. principal geology (lithology, genesis, stratigraphy), structural geology and tectonics, hydrogeology, engineering geology, mineralogy, geophysics.

The analysis and interpretation of data follows on the third level: uni- and multivariate analysis methods, geostatistical tools, multispedes- and multiphase diagrams, cross sections etc.

The fourth level of the modules; Dynamic modelling tools for sedimentology, tectonics, hydrogeology, environmental geology and engineering geology etc. The list of models can be long - it depends on participation at the project.

OpenSource

Task for the development of MO2Geo is a complex geological workbench for several fields In geology and not a commercial product. Surplus it is vital to reach
* A wide spreading of the tools
- A dynamic development of the modules
Therefore the OpenSource software concept is most useful. This opens also doors for connections to other OpenSource tools (e.g. GRASS-GIS), various operating *systems and hardware.*
All programs and modules refer to the General Public License (GPL). Most of the modules will be written in C++, using the GUI-toolkit wxWidgets. The preferred operating system is Linux. Possible further connections are GRASS-GIS and the PostgreSQL database management system (although a lot of data will be held in ASCII-textfiles in the first modules).

Object oriented

in the field and in the laboratory geological data are singular objects: A well, a quarry, results of data logging, measurements of outcrops etc. These singular *datasets (objects)* have to be aggregated in the next steps of interpretation, analysis and modelling. An orientation at these geological objects in the programming structure is therefore a logical solution.

The modular structure leads to an object oriented programming language. Surplus tests and support of the modules is much easier with objects. For C++ code the OpenSource compilers are used.

We hope and invite geoscientists (but also scientists from other disciplines, e.g. computer science) to take part in the development and testing of the software.

"Things that one can not do alone, can be done by many people" (free translation from Friedrich Wilhelm Ralffeisen, 1818-1888)

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