

# Mechanics of a 3D geological survey

R. Dearden, H. Kessler and B. Wood

## The role of the 3D geological survey

- Custodian of the National Geological Model
- Development of multi-scale and multi-purpose geological models
- Long-term storage and versioning of geological model data
- Delivery in a wide variety of formats to end-users
- Management, quality control and incorporation of geological model feedback submitted by the geoscience community.

## INTERPRETING THE GEOLOGY ...

## MAKING SENSE OF DATA ... GENERATING THE COMPONENTS



GEOLOGICAL MODELS CREATED FROM THE GEOLOGICAL MAP, BOREHOLE INTERPRETATIONS, CROSS SECTIONS, COVERAGES, FAULTS, SPECIAL SHAPES AND POINT CLOUDS, TO CREATE THE MODERN DAY 'STANDARD'

GENERATE & EDIT GEOLOGICAL OBJECTS TO CREATE & REFINE GEOLOGICAL MODELS

CHECK OUT THE GEOLOGICAL OBJECTS THAT ALREADY EXIST FOR THE AREA BEING MODELLED

CHECK OUT

CHECK IN

ALL NEW AND REVISED OBJECTS WILL BE SCRUTINISED AND CHECKED BEFORE BEING ACCEPTED INTO THE OBJECT STORE

CENTRAL GEOLOGICAL OBJECT STORE  
THE OBJECT STORE HOLDS THE CROSS SECTIONS, COVERAGES, DTMs, FAULTS AND COMPLEX SHAPES. DON'T STORE WHAT YOU CAN CALCULATE.

## STORING THE PARTS

## RUNNING THE ENGINE

THE ENGINE TAKES THE NODES DRAWN BY THE GEOLOGIST IN CROSS SECTION AND IN COVERAGES, ALSO THOSE IN FAULTS AND IN SPECIAL SHAPES AND USING THE DTM WHERE NECESSARY ...

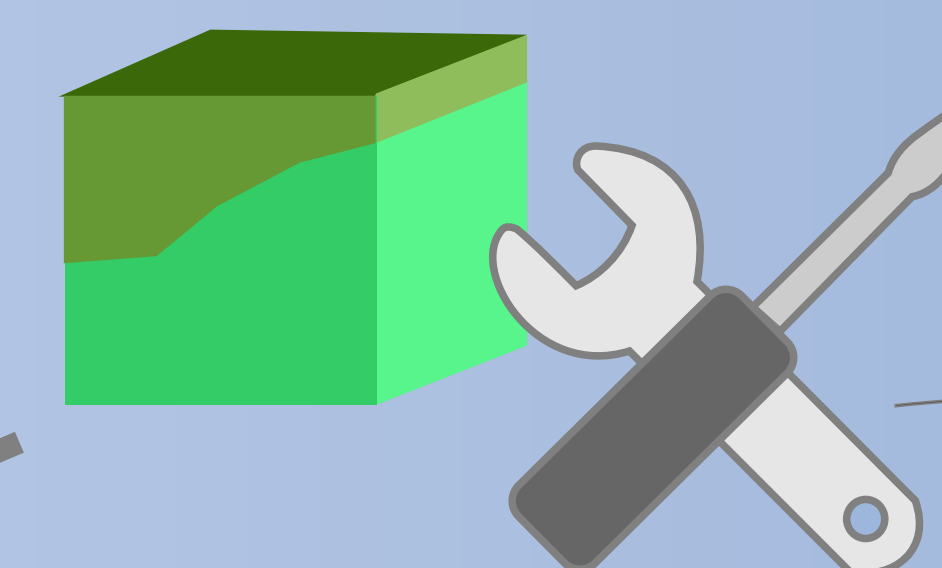
...THOSE POINTS ARE CONVERTED TO 2D & 3D GEOMETRIES

TRACTION

THE APPROVED SET OF GEOLOGICAL OBJECTS FIT TOGETHER PRECISELY TO REPRODUCE THE MODEL WITHIN WHICH THEY WERE ORIGINALLY CREATED, OR TO PRODUCE A DERIVATIVE OF THAT MODEL, FOR A SMALLER SUBSET OF THE AREA OR ONE WITH A DIFFERENT STRATIGRAPHIC COMPLEXITY

INITIATING A VAST ARRAY OF EXCITING POSSIBILITIES FOR NEW DERIVED 3D DATASETS AND 3D GIS

## DELIVERING THE PRODUCTS



FEEDBACK FROM CLIENTS LEADS TO CONTINUOUS MODEL IMPROVEMENT

EDITABLE OUTPUTS  
• 2D CROSS SECTIONS  
• 3D GEOLOGICAL MODELS

MODEL + DATA

EDITABLE

GRIDDED OUTPUTS  
• 2D CROSS SECTIONS  
• 2D HORIZONTAL SECTIONS  
• UNIT THICKNESSES

GRIDDING

STATIC OUTPUTS  
• THE GEOLOGICAL MAP  
• 3D GEOLOGICAL MODELS  
• 2D CROSS SECTIONS  
• 2D HORIZONTAL SECTIONS  
• GEOLOGICAL SURFACES  
• UNIT THICKNESSES

MODELS USED FOR DECISION-MAKING

## CHALLENGES AHEAD

- Improve access to geological model data.
- Improve access to raw data and interpretations used in the construction of geological models.
- Educate end-users about modelling methodologies and the importance of interpretation.
- Provide incentives for professional geoscientists to provide model feedback.
- Become pragmatic about linework quality (do we have the funds to gold plate linework?).
- Develop guided modelling environments for external users that allow them to edit models with simple tools that provide access to the relevant geological units.



