



# Geological Expression – A New Approach to Volume Interpretation

Gaynor Paton, ffA

# The Value of Data



~\$8000M global annual spend on seismic acquisition and processing.

11,500,000 sq km of "licensed" offshore acreage most covered by seismic

# The Value of Data

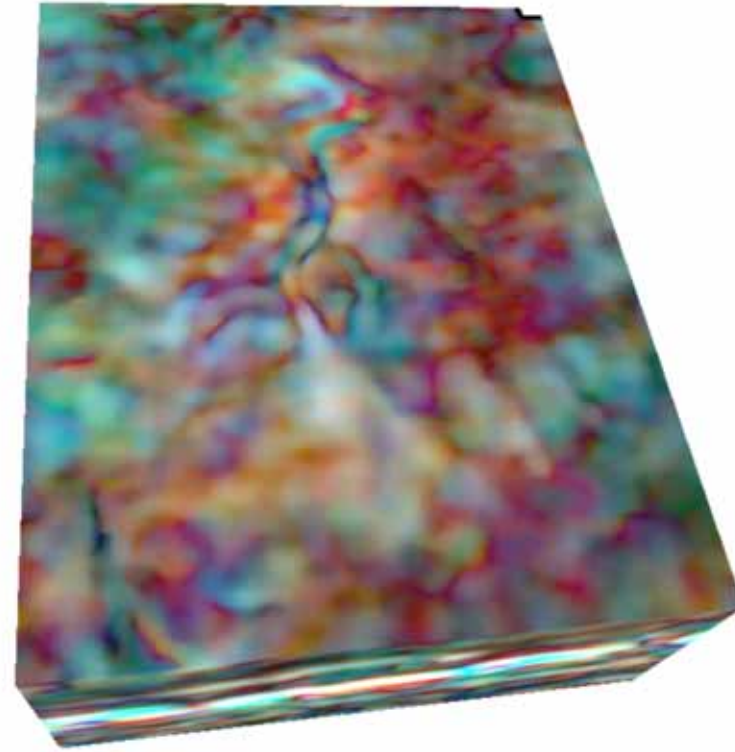
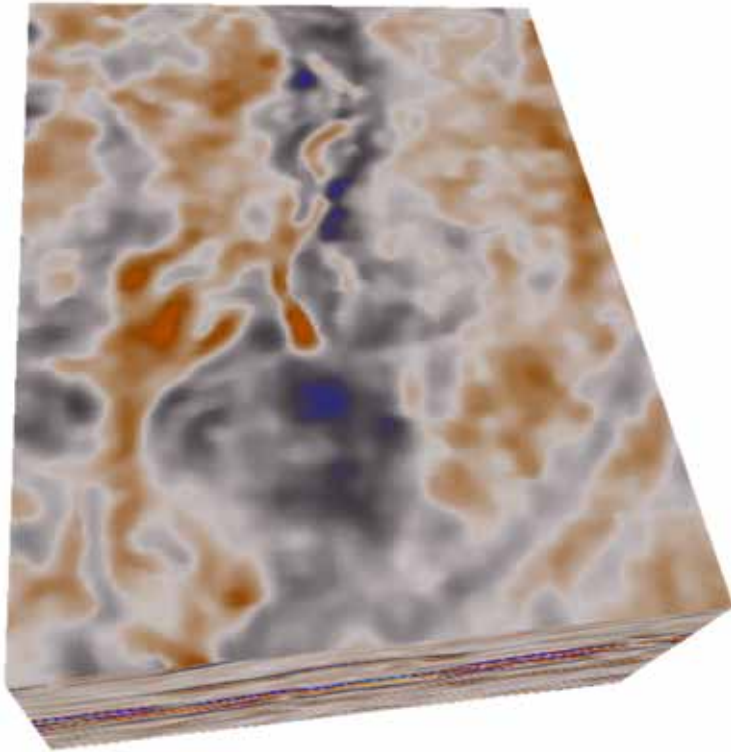
The **Value of Data** comes from the **Information** it contains...

- Conventional horizon and fault interpretation captures only a small fraction of the information contained in seismic data.
- **The majority of information is only accessed by analysing the seismic character → Attribute Analysis**
- More “processing” can lead to information overload rather than better understanding.

... the **Value of Information** is in the **Understanding** it confers.

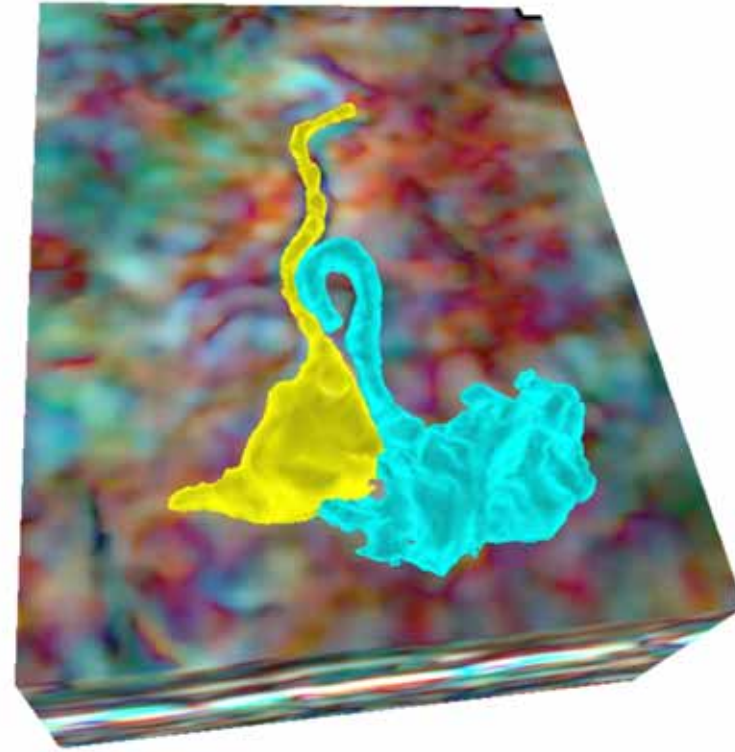
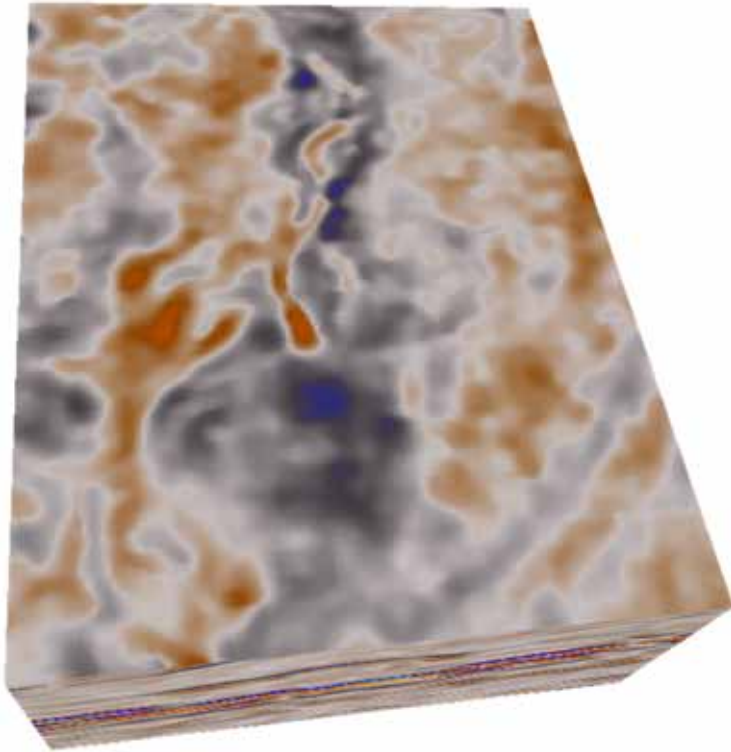
**Geological Expression : Data Driven - Interpreter Guided  
method for highlighting and extracting  
geological features**

# Geological Expression Workflow



Attribute Analysis

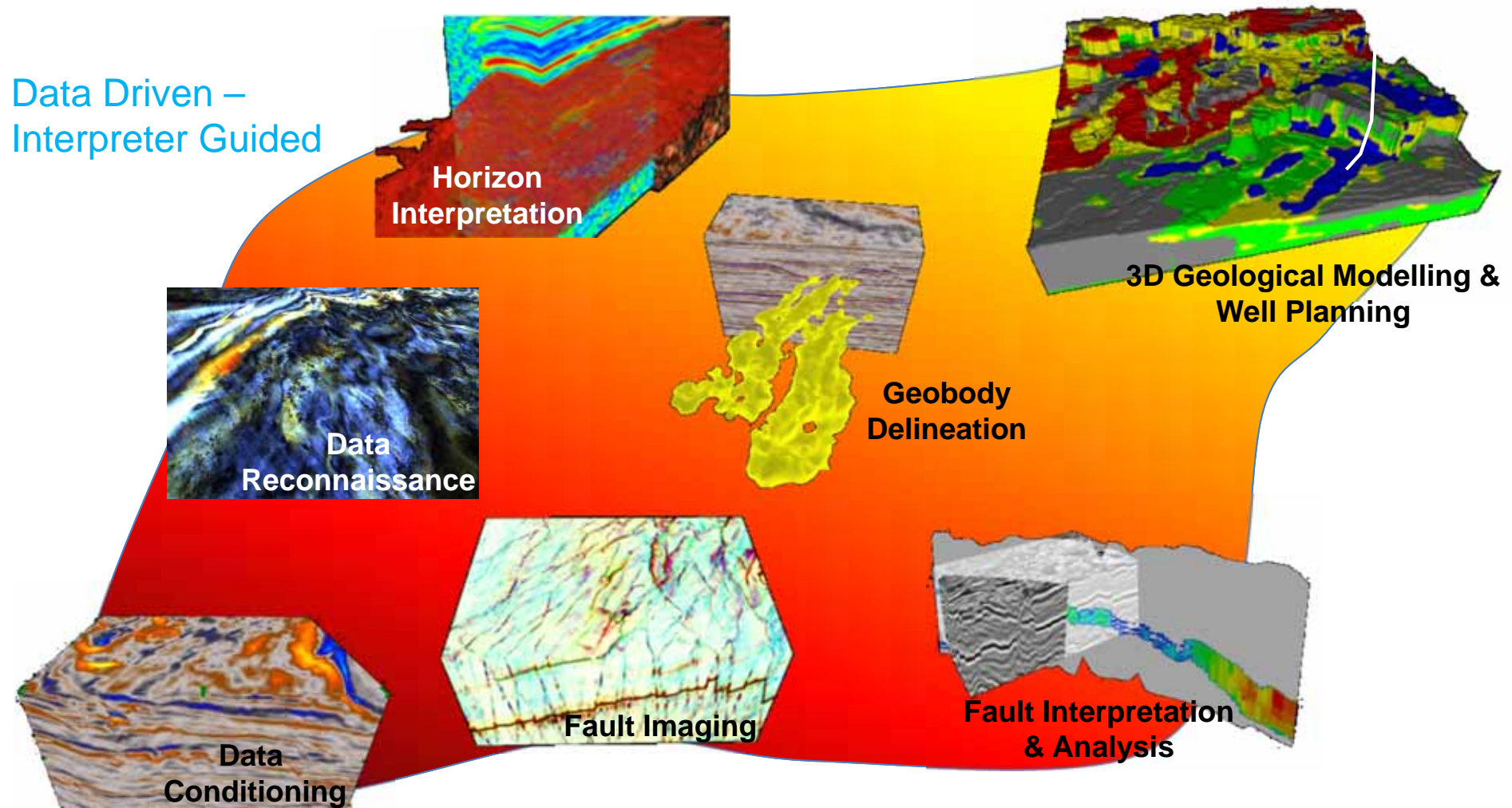
# Geological Expression Workflow



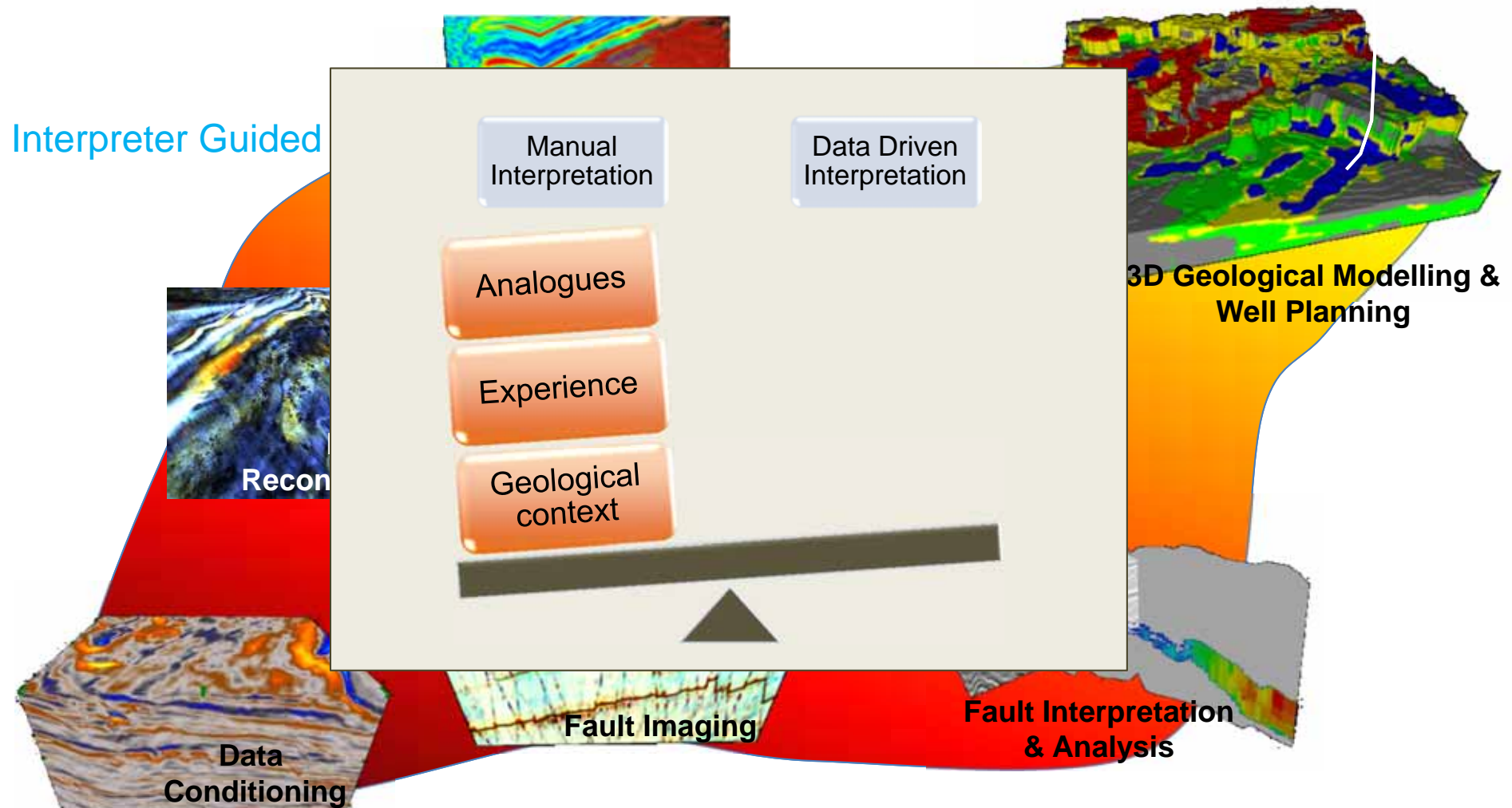
Geological Expression



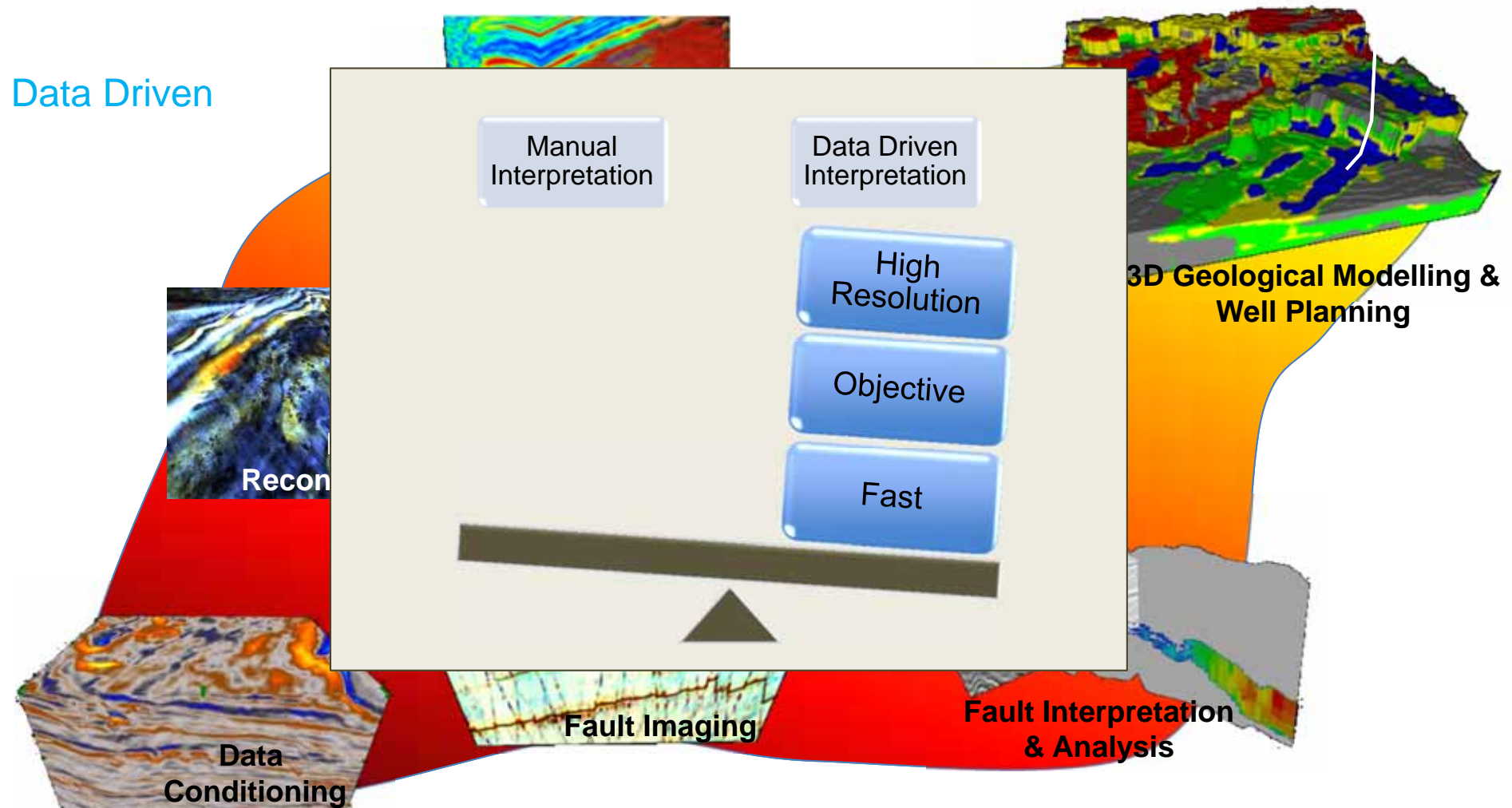
# Geological Expression Workflow



# Geological Expression Workflow

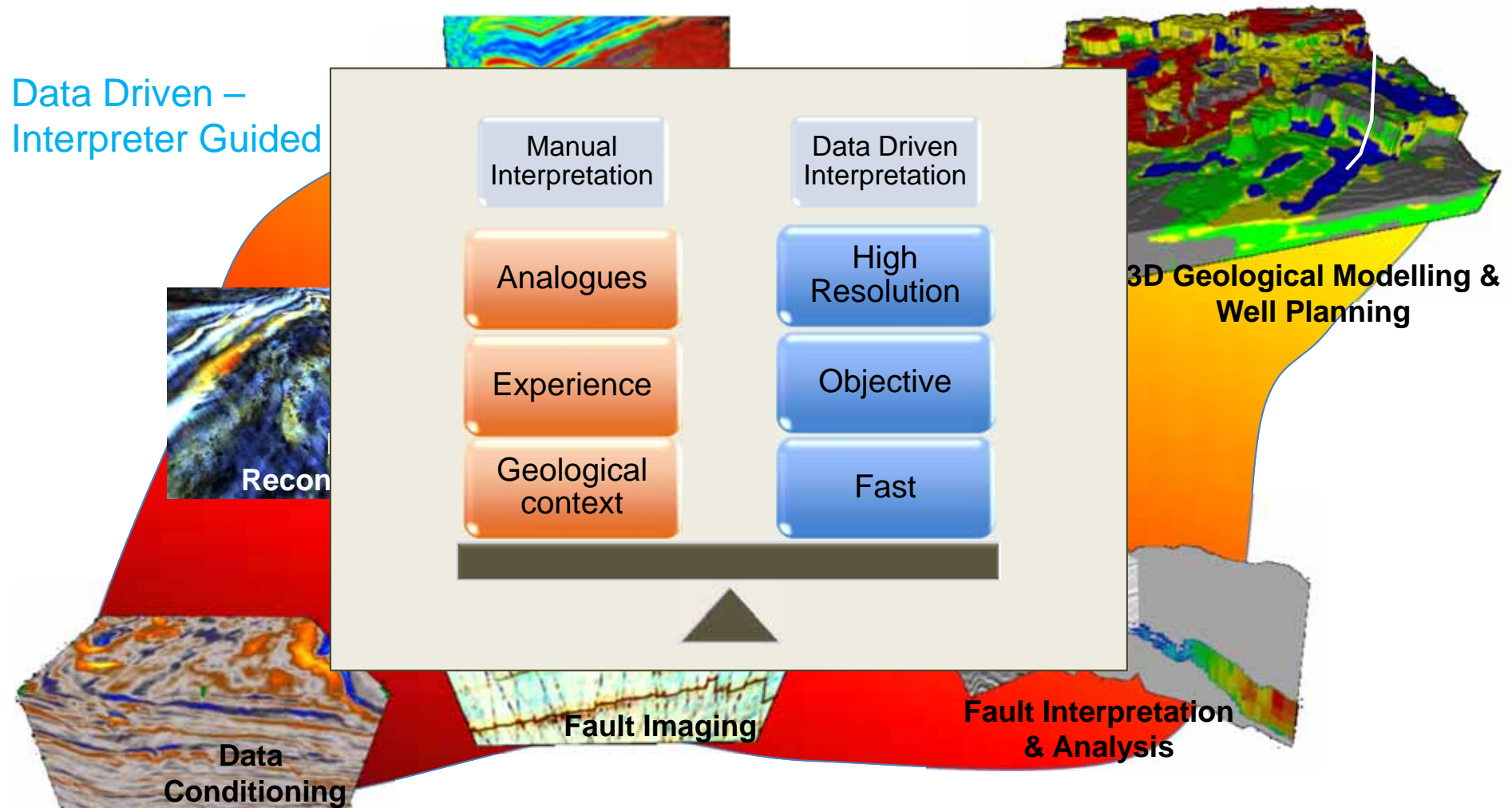


# Geological Expression Workflow





# Geological Expression Workflow



# Geological Expression Workflow

To be successful, Geological Expression workflows must encompass:

- On-demand extraction of geological features
  - Interactive fault delineation
  - Interactive geobody delineation
  - Interactive seismic facies classification

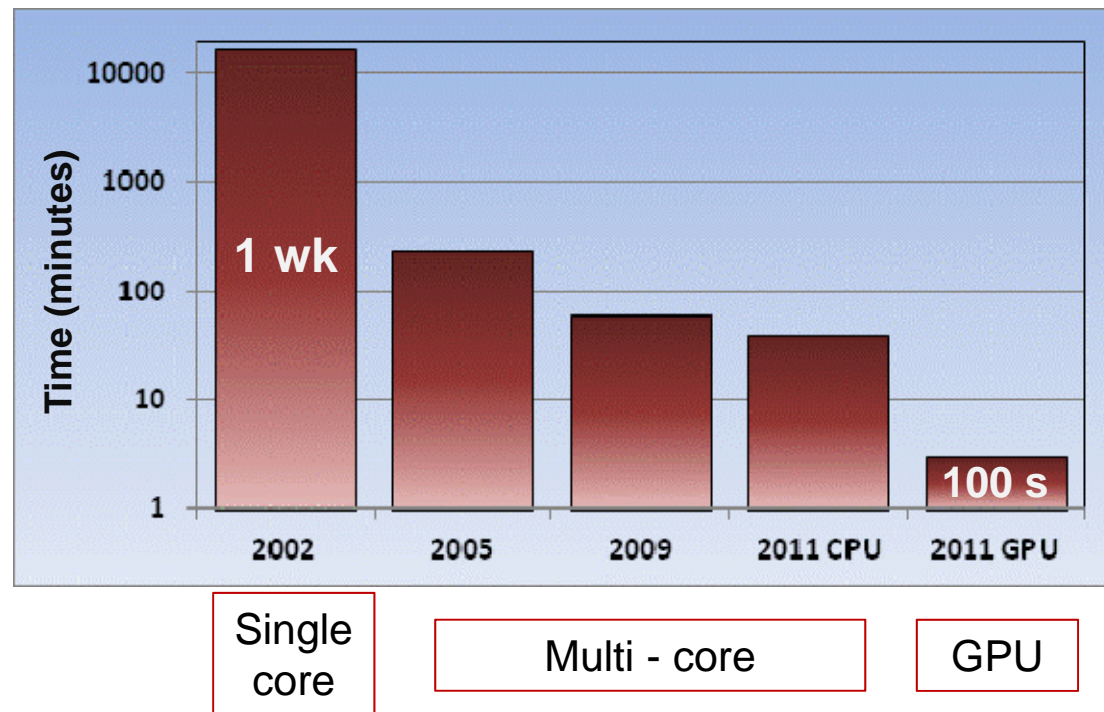
**Speed of Analysis = Speed of Interpretation**

# Compute power at your desktop

## Why is compute power important?

- Different interpretation scenarios
- Combine objective seismic analysis with expert assessment of the geological meaning
- Results instantly available to keep up with the train of thought
- Minimise data overload.

Volume Attribute Computation Times (200 sq km)

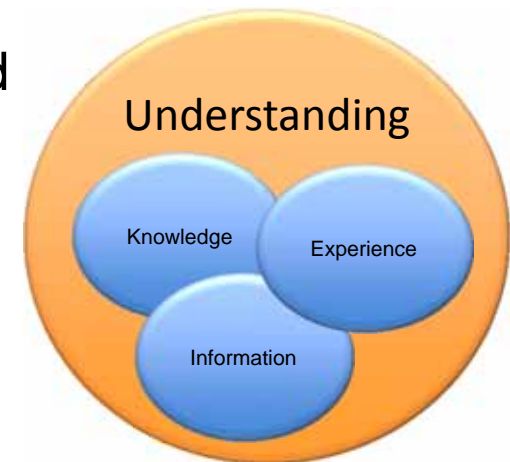


Computing technology has not reached a steady state.  
Costs (£/Gflop) will continue to fall: Architectures will continue to change.

# Geological Expression Challenges & Solutions

Software design - More than just number crunching

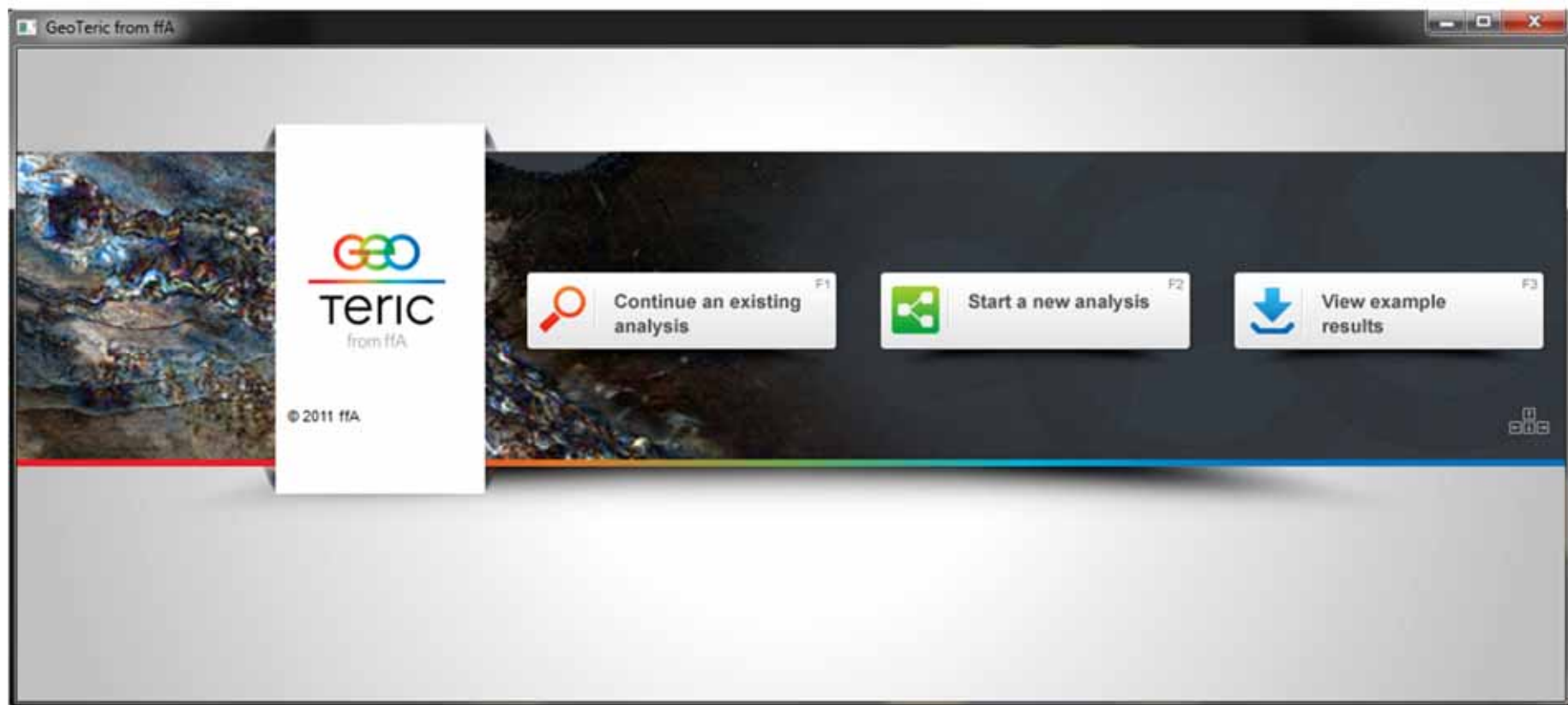
- Must accommodate large geological variations and large data variations
- Must provide new information
- Must recognise that seismic doesn't give the whole answer
- Mustn't exacerbate the problem of data overload
- Must facilitate a smooth flow of information



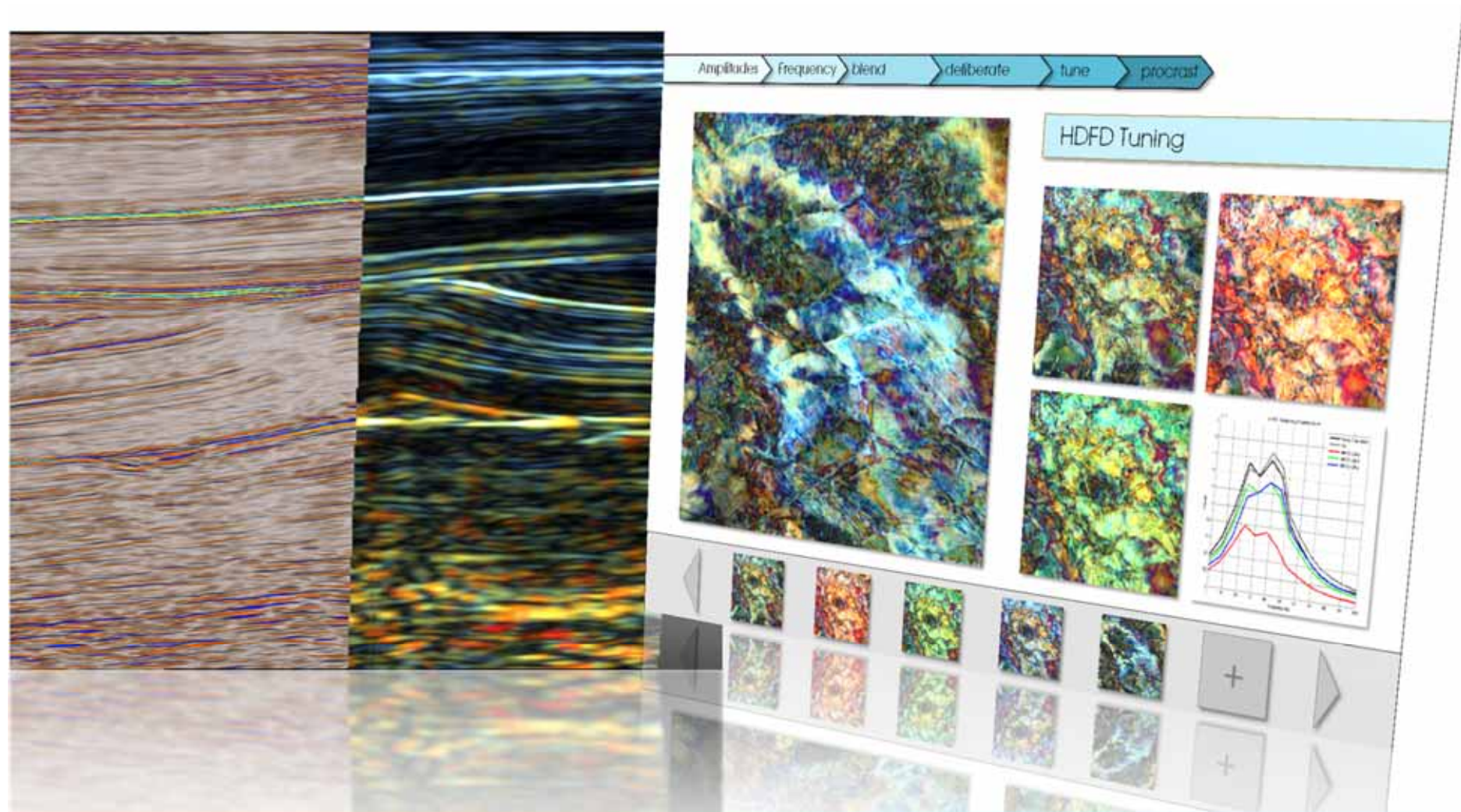


# GeoTeric

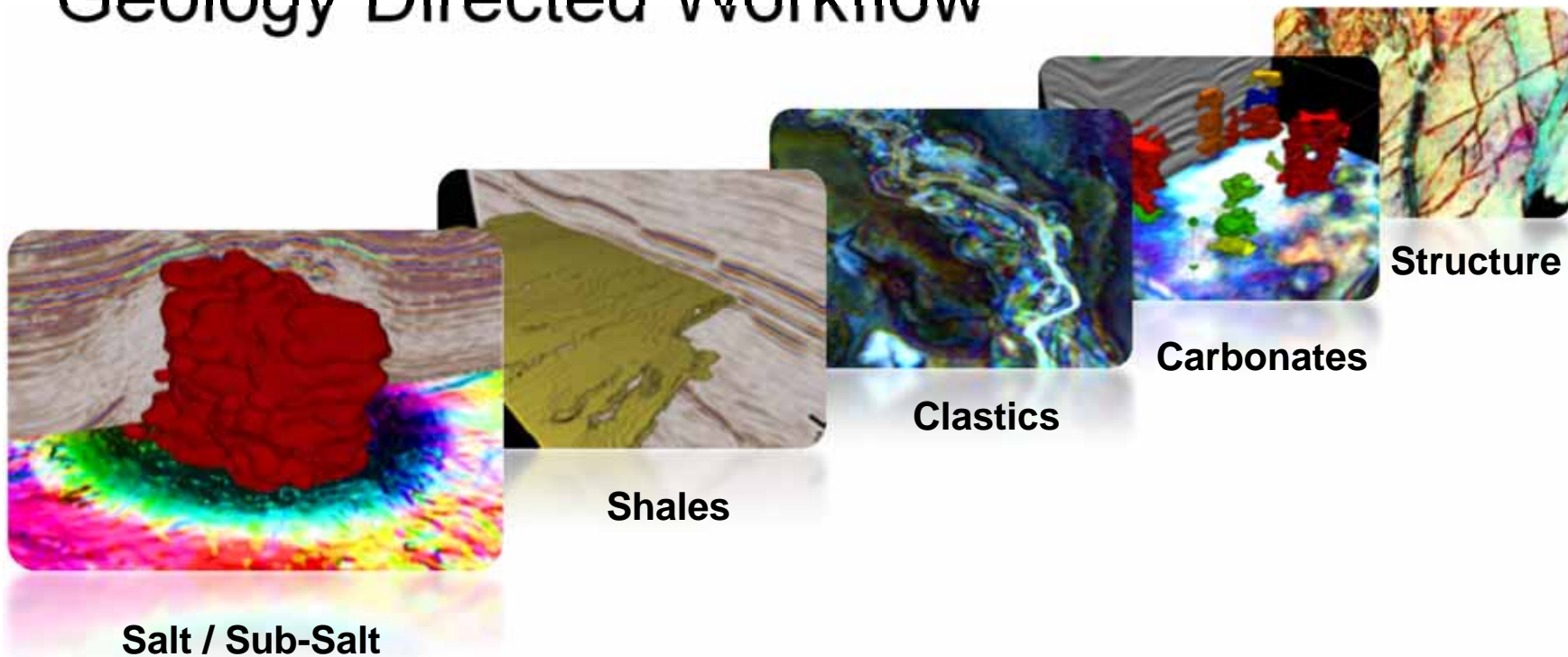
Geological Expression software



# GeoTeric

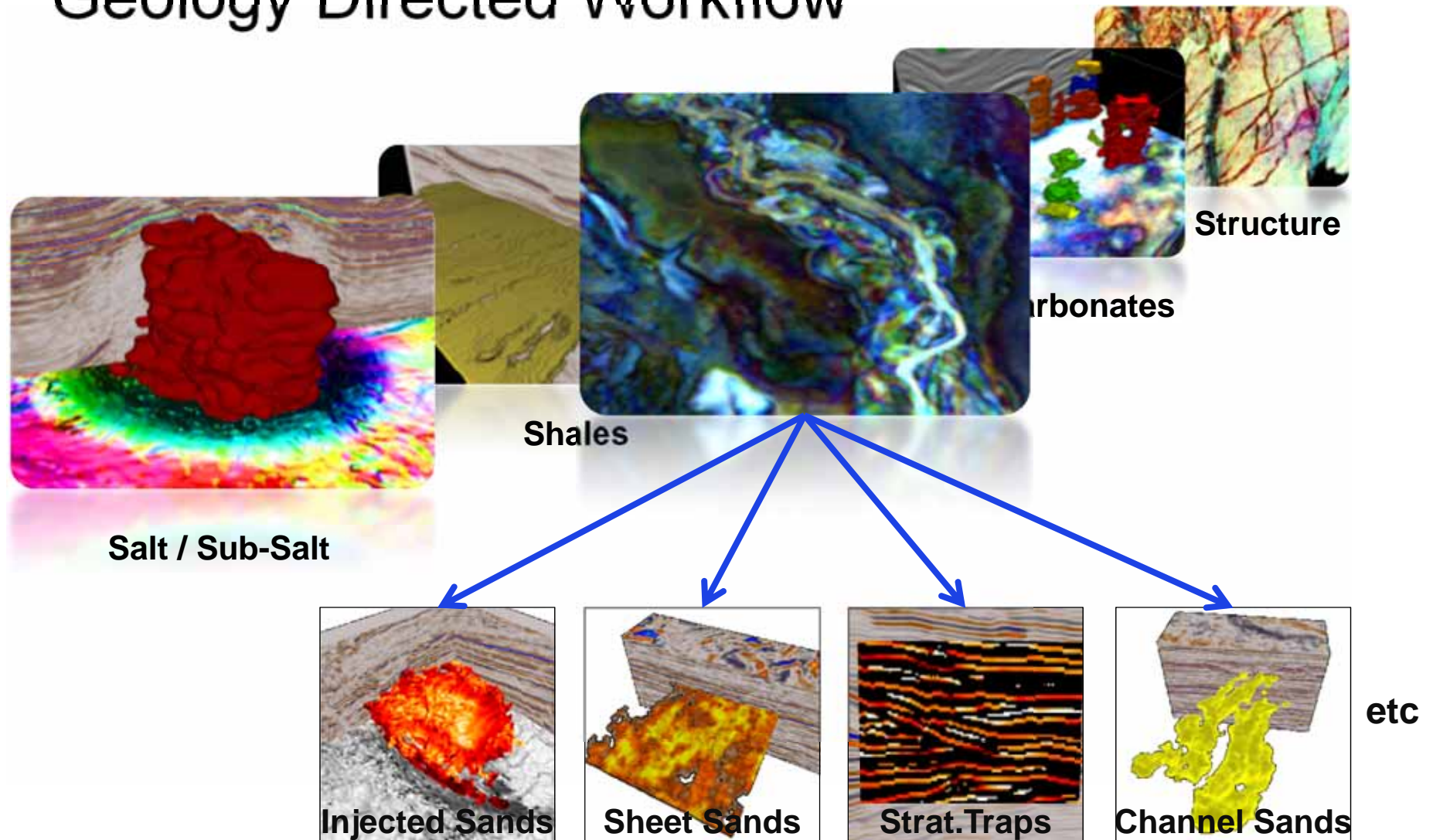


# Geology Directed Workflow





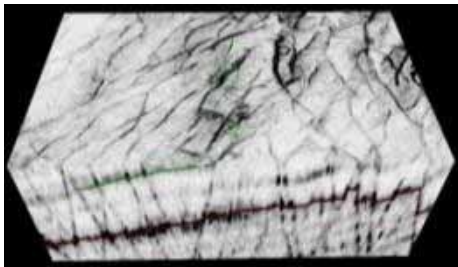
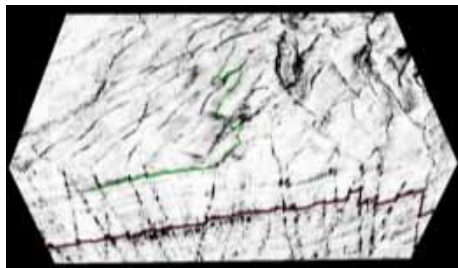
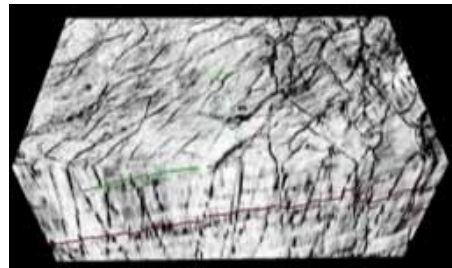
# Geology Directed Workflow



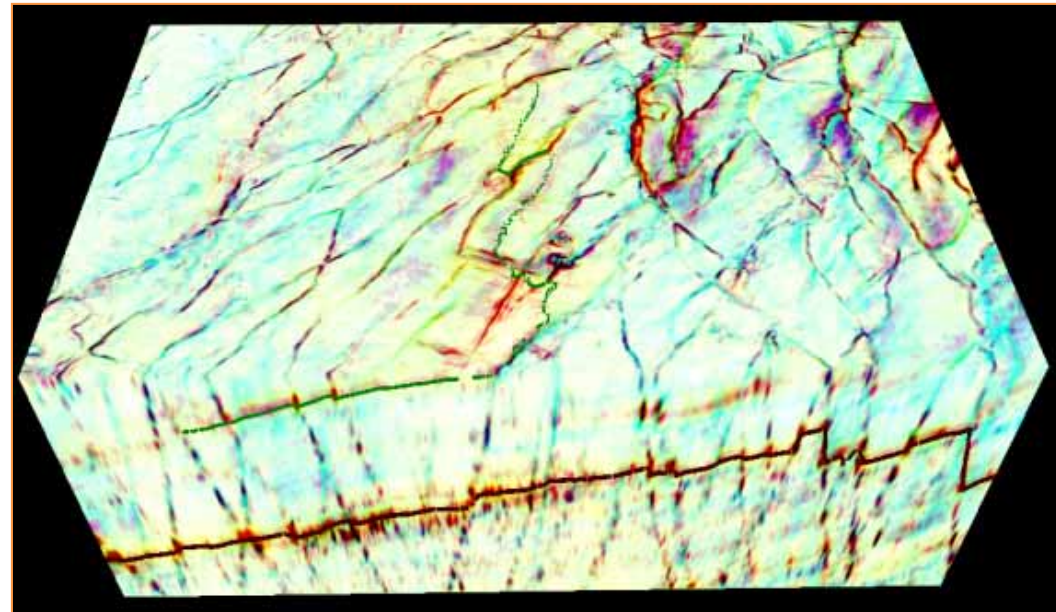


# Colour Visualisation and Analysis

## Improved Attribute Algorithms – Colour Blending



N  
↑



2km

Ductile

Semblance

Displacement

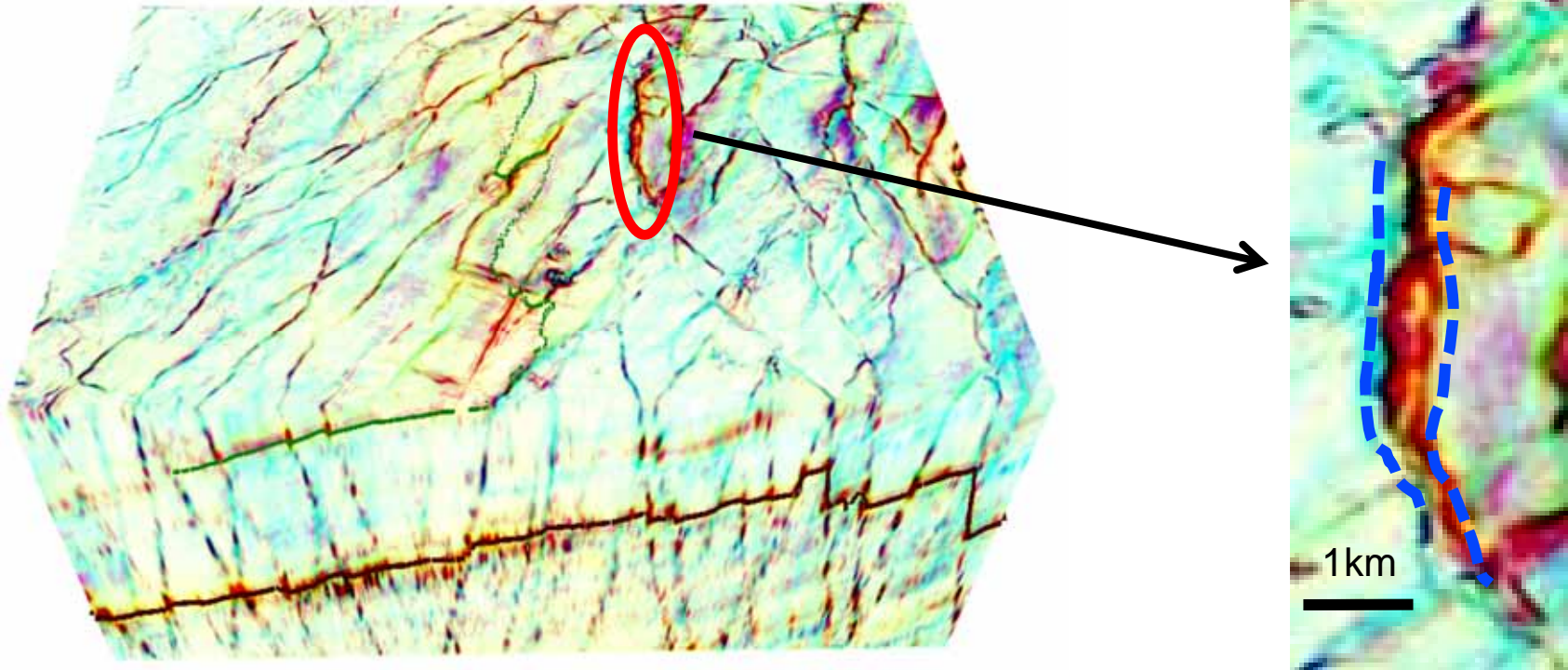
Lithology / Fluid  
change

Discontinuity

Tensor

# New Seismic Analysis Workflows

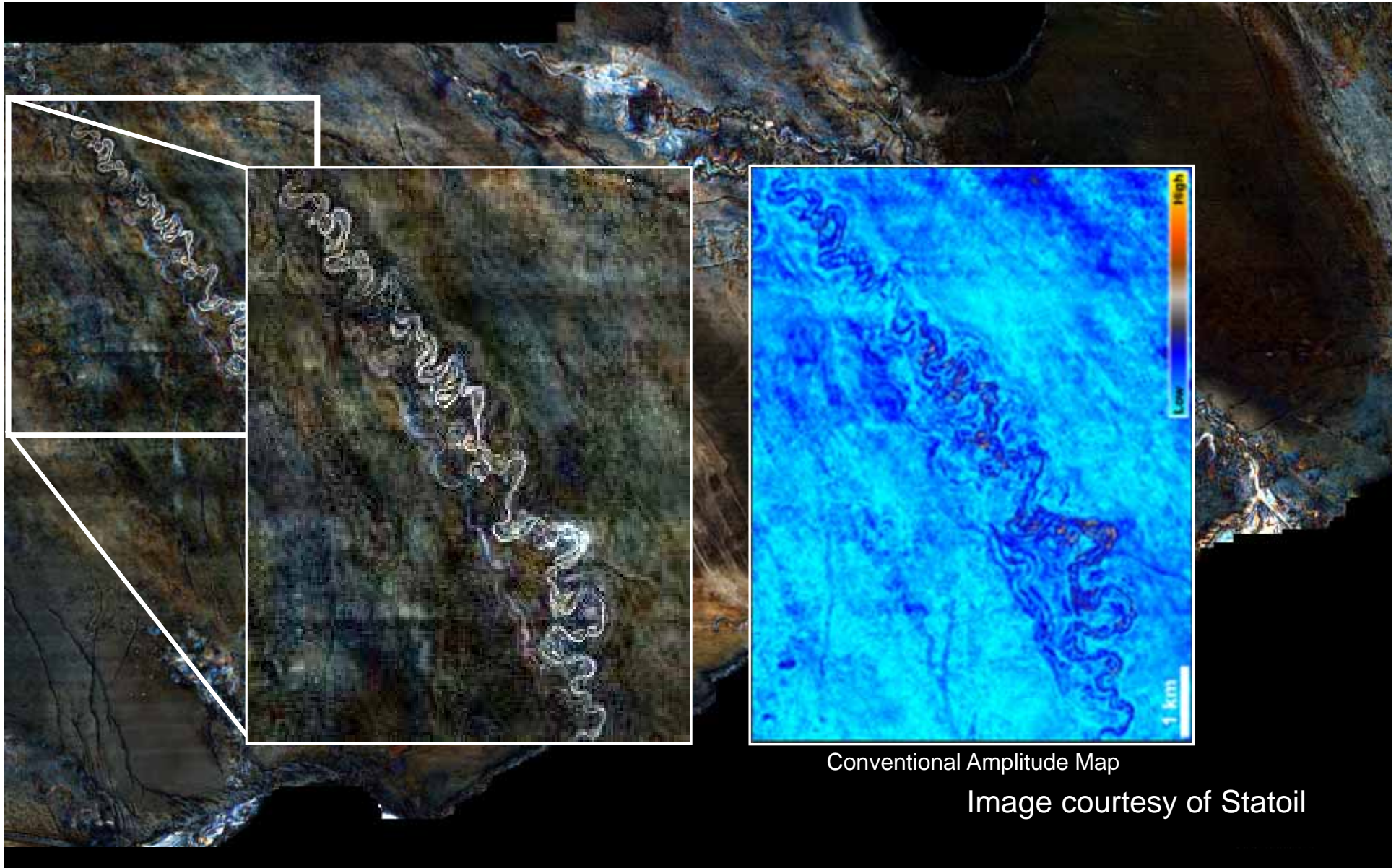
## Seismic Fault Damage Zone Analysis.



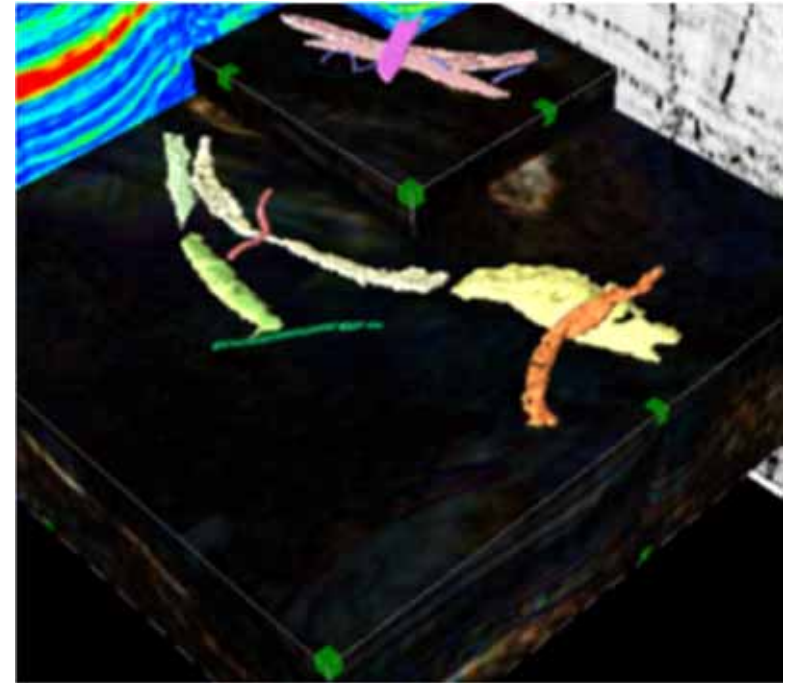
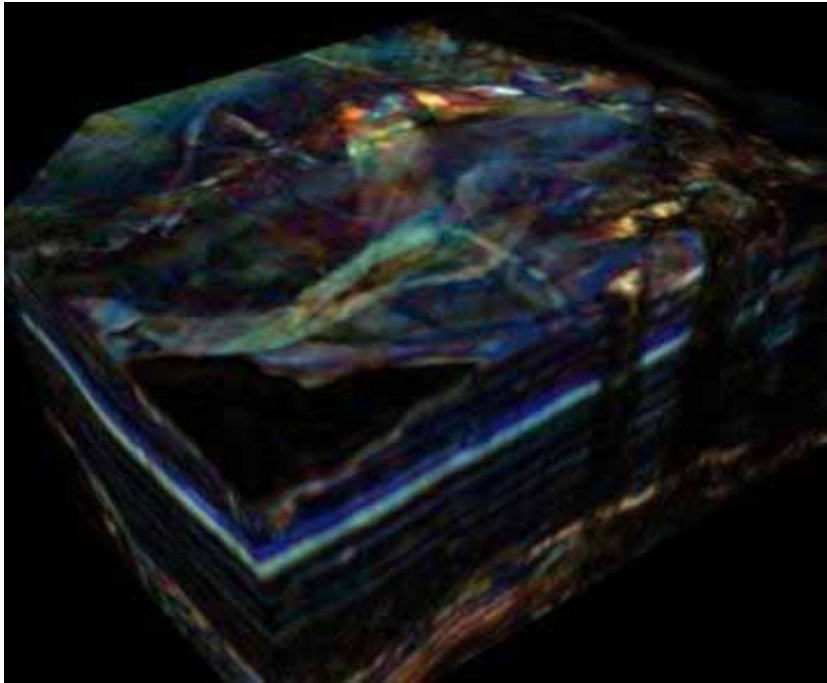
Providing access to more and previously inaccessible information.



# Colour Visualisation and Analysis

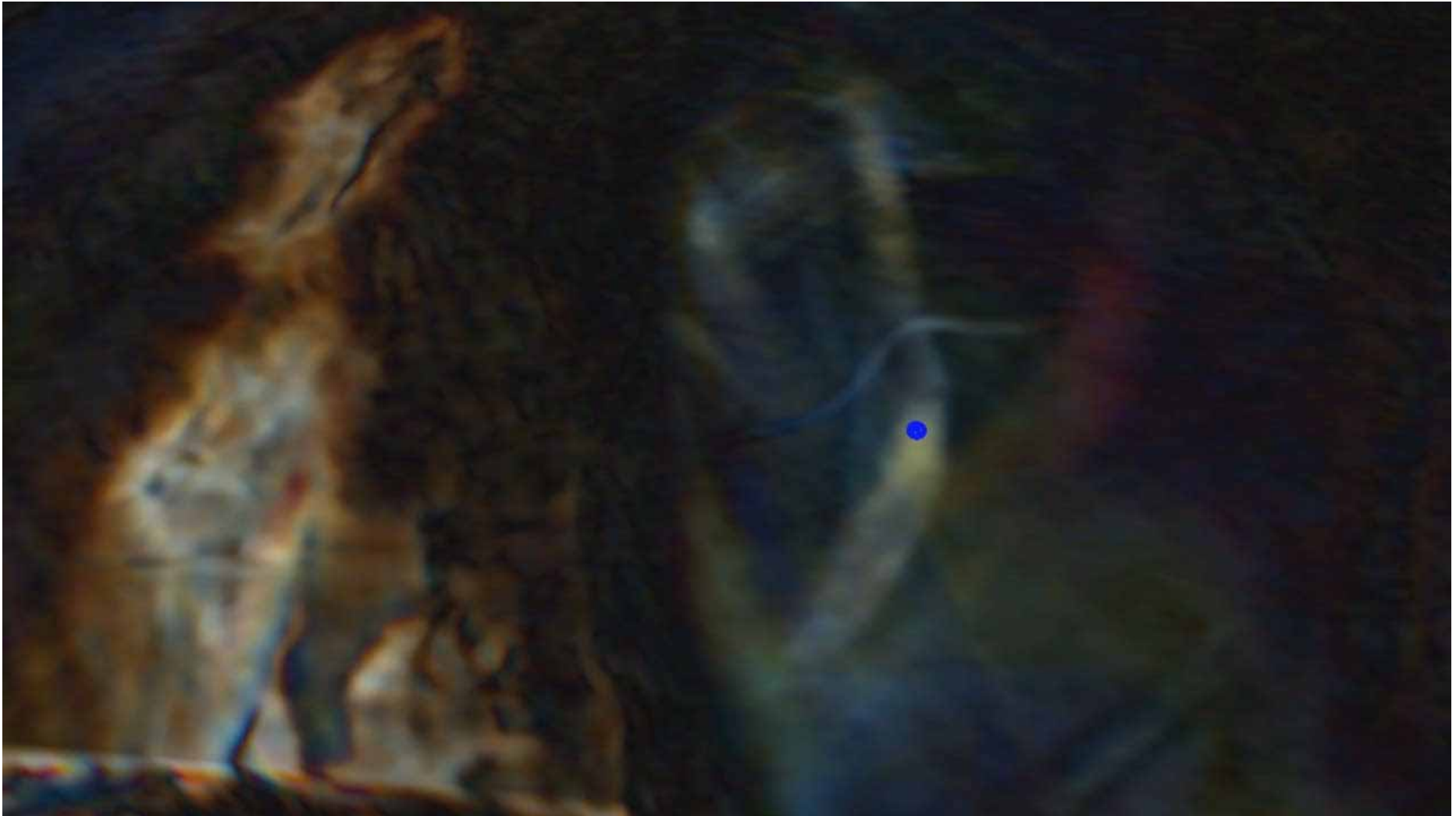


# Data Driven – Interpreter Guided workflows



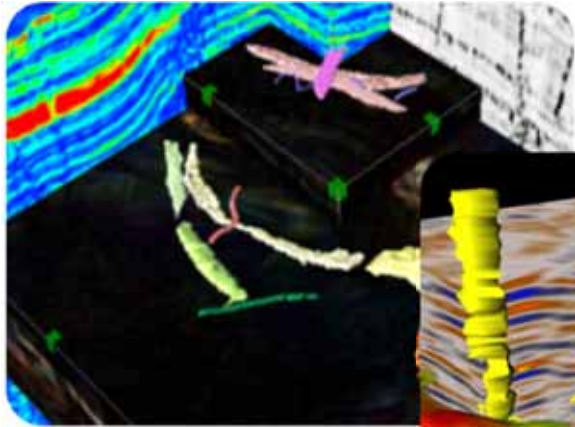


# Data Driven – Interpreter Guided workflows

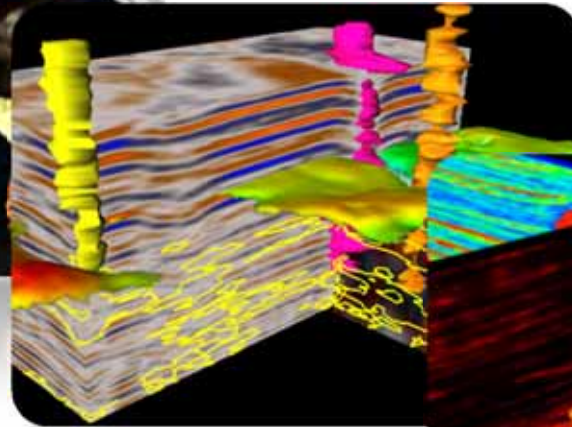


# Data Driven – Interpreter Guided workflows

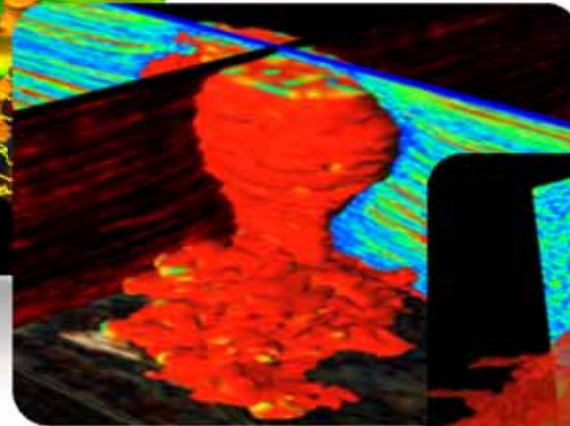
Adaptive Geobodies



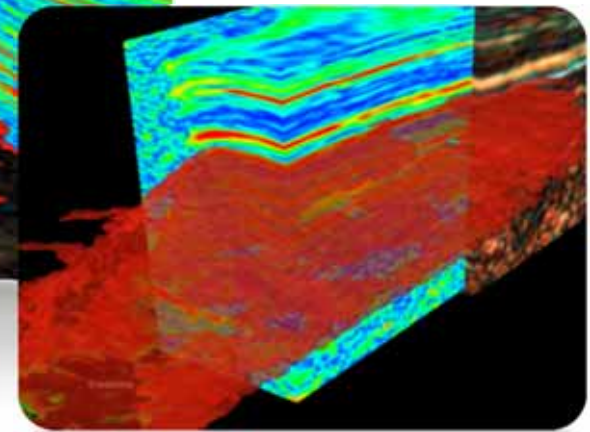
**Channels**



**Karsts**



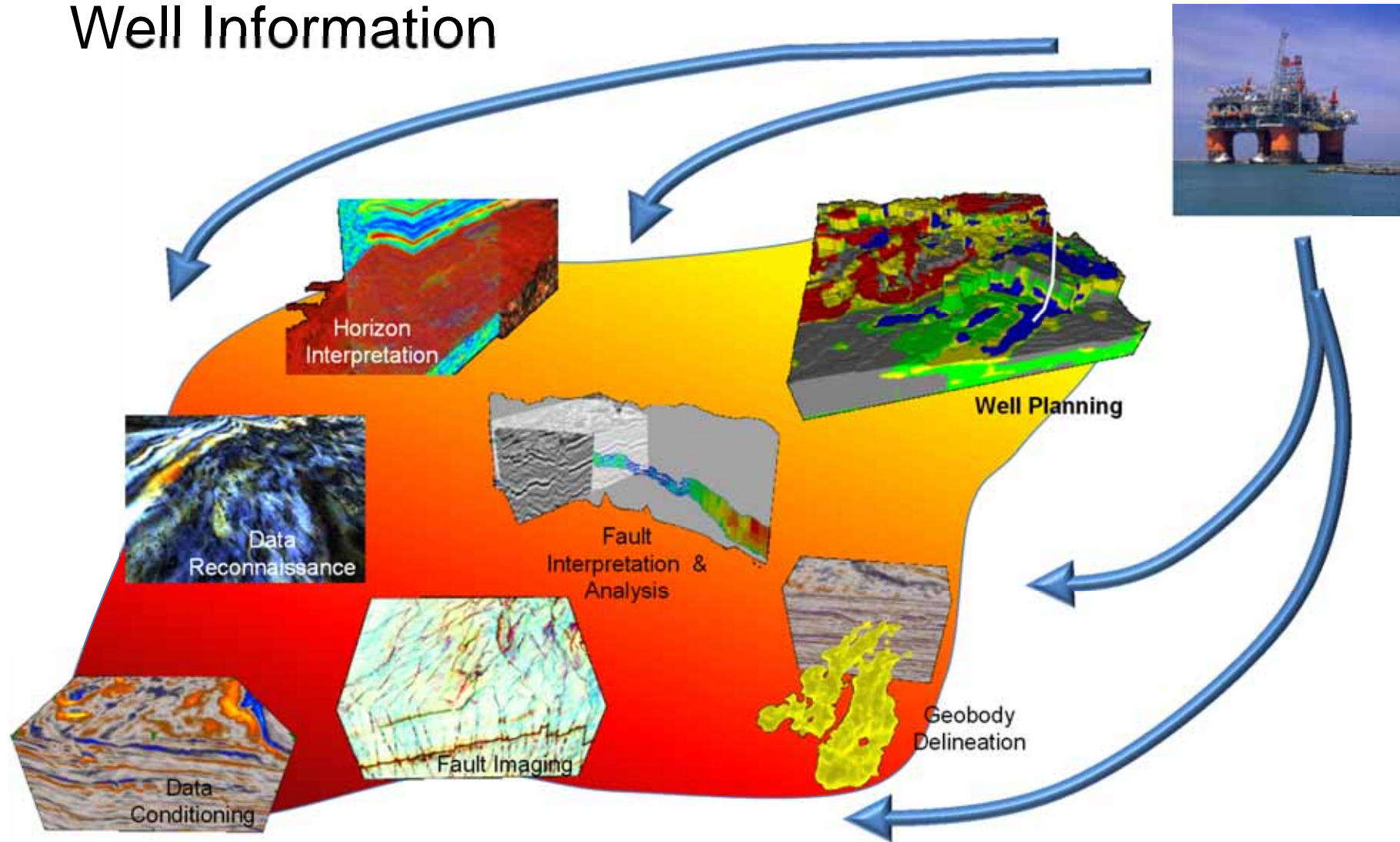
**Salt**



**Horizons**

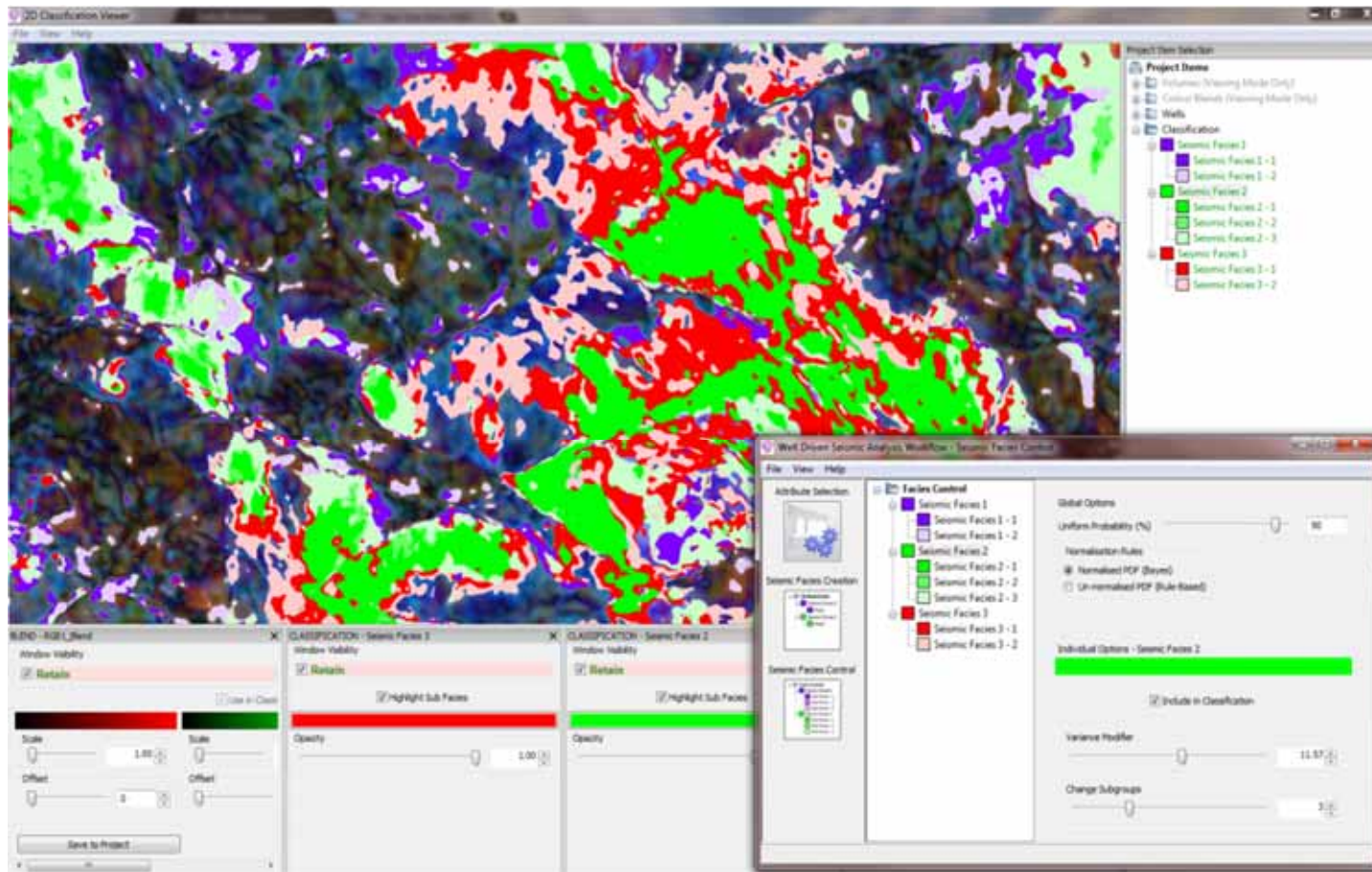
Can now extract any  
stratigraphic feature  
that is visible in the data

# Geological Expression workflow – Integration of Well Information





# Combined Well & Seismic Data Workflows

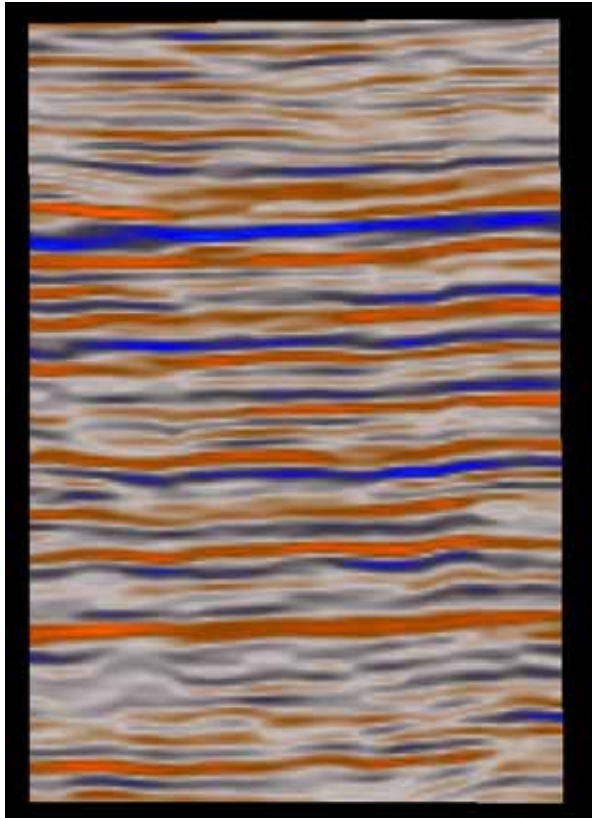


Real time  
hierarchical  
seismic facies  
definition  
controlled by  
well data

Developed in Collaboration with Statoil



# High Definition Frequency Decomposition



Input data



Standard  
Frequency Decomposition

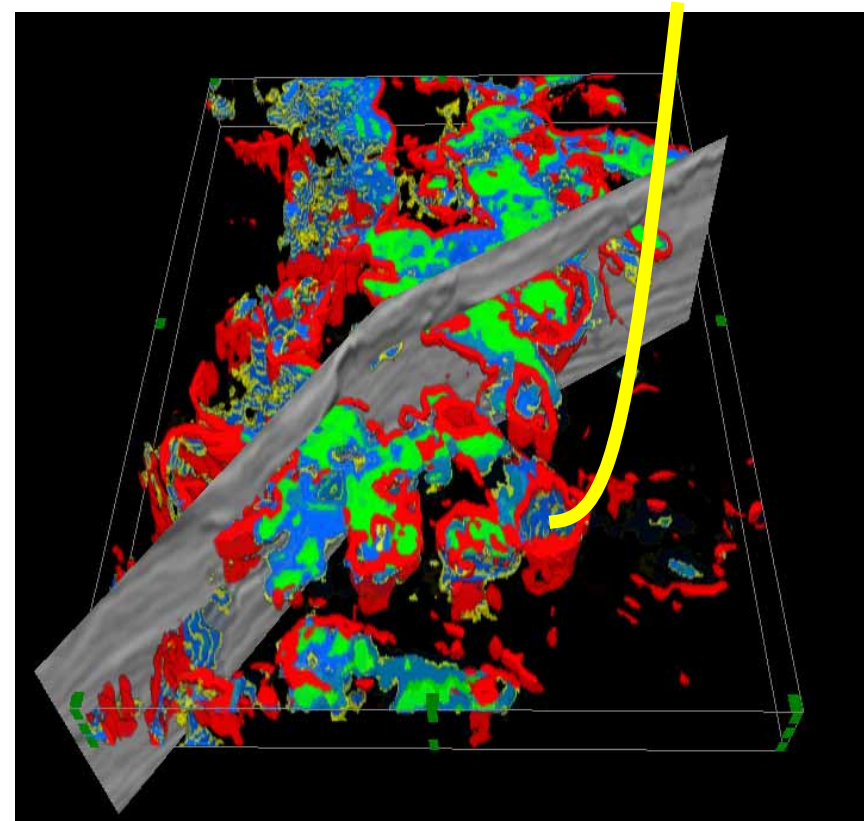


HD  
Frequency Decomposition

# Summary

## Geological Expression – The Future of Seismic Interpretation

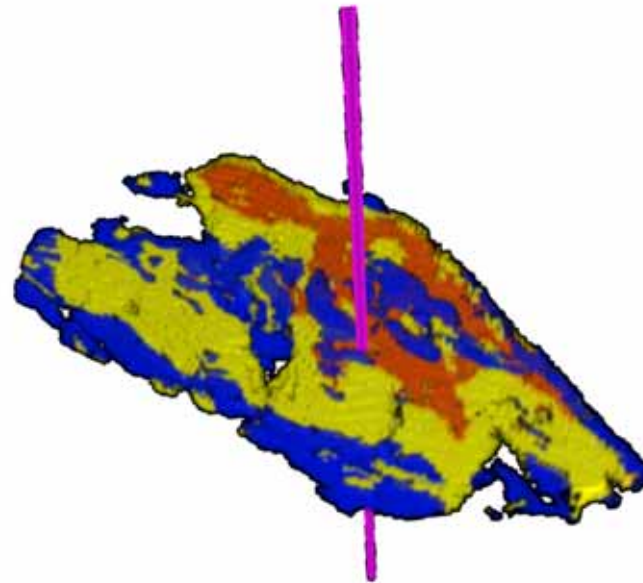
- Interactive Data Driven – Interpreter Guided approach
- Large productivity gains
- Geological Expression workflows will give us the power to make the most informed seismically driven decisions.



# Summary



**Geological Expression: A more efficient path from seismic to drilling..**



**..delivering more accurate results with greater certainty.**





# Thank You

[www.GeoTeric.com](http://www.GeoTeric.com)



Put new  
levels of seismic  
interpretation  
at your  
fingertips