Structural Framework Workflows for Petrel 2018

Module 1: Introduction to subsurface modeling

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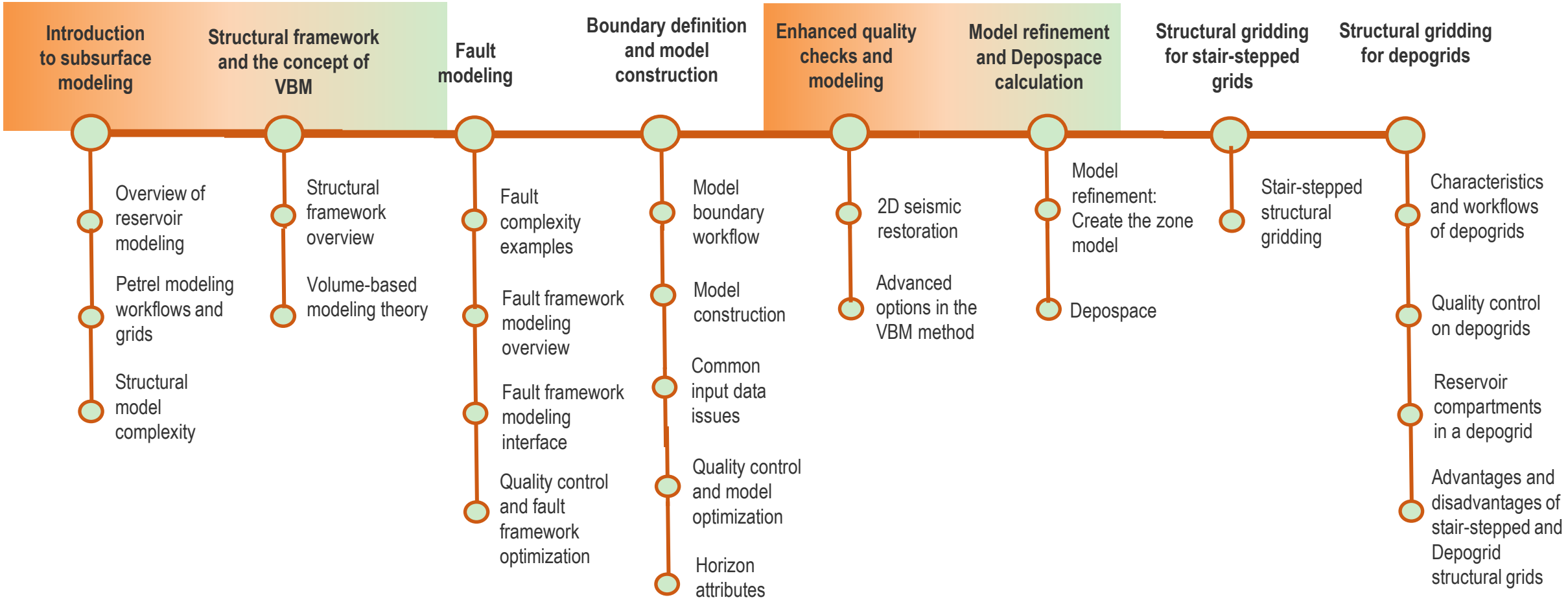
Structural framework with Petrel 2018 – Modeling line



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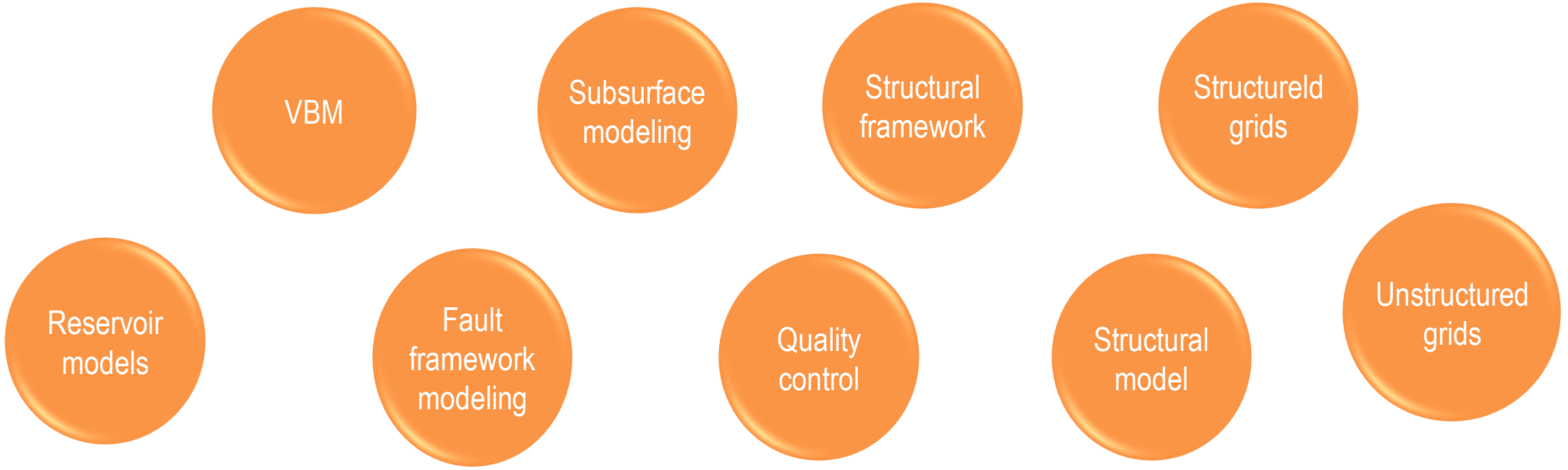
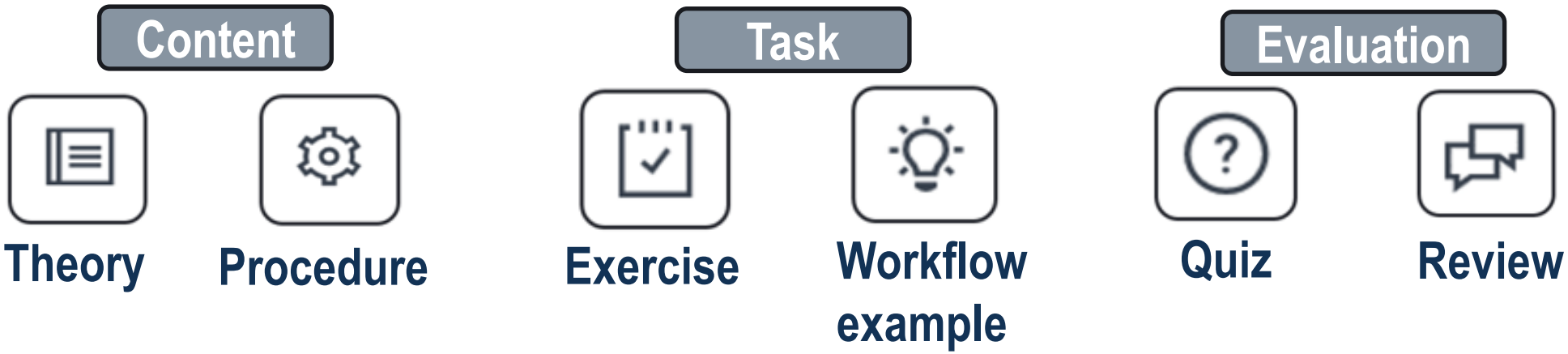
Agenda
Structural framework– Day 1

9.00-12.00	12.00-12.30	12.30-14.00	14.00-16.45	16.45-17.00
Introduction to subsurface modeling	Lunch	Structural framework and the concept of VBM	Fault modeling	Review

KEYWORDS



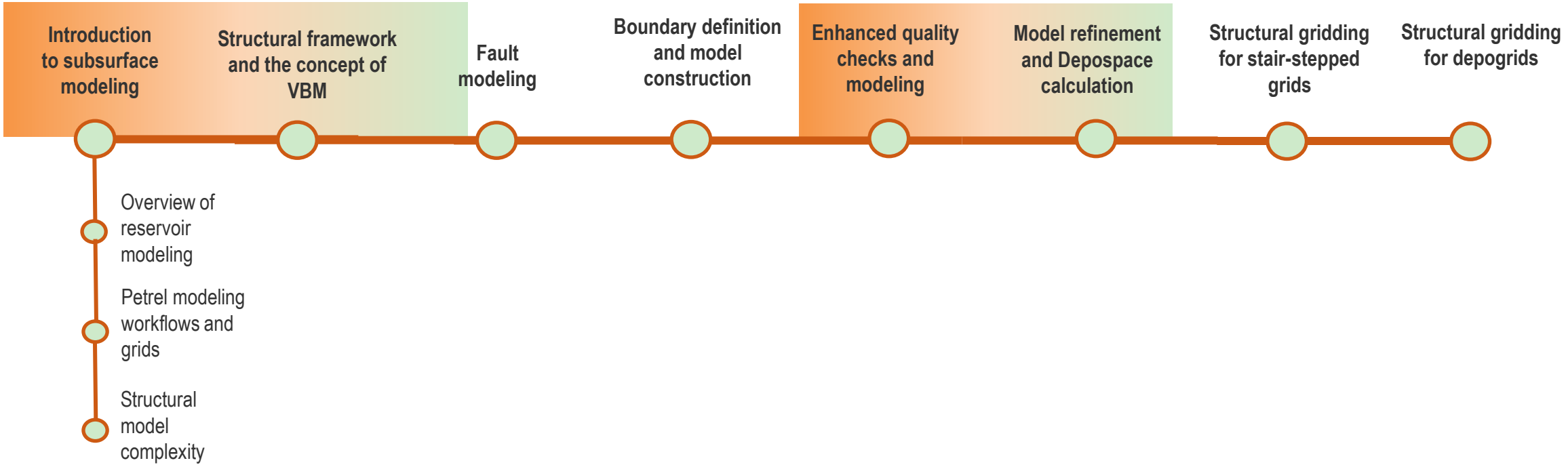
Elements in the course



Rules

- Keep your mobile devices in silent mode.
- Take any phone call outside the class.
- Everyone's perspective counts.
- Let the instructor know if you need a break.
- The instructor will help with group work when solving the challenges.
- Think simple when you try to solve challenges.

Module 1: Introduction to subsurface modeling



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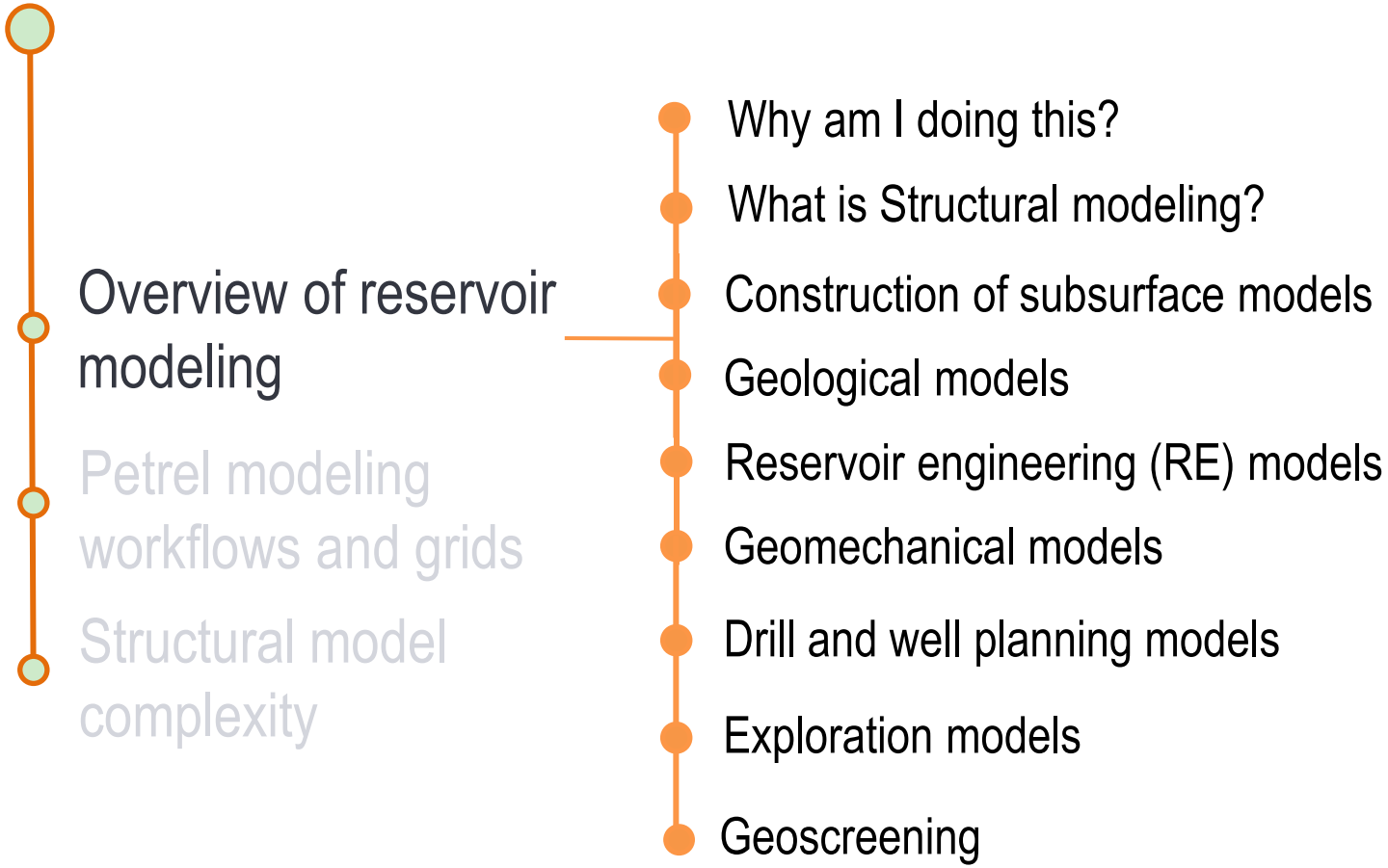
Learning objectives

When you complete this module, you will understand:

- the concepts of reservoir modeling
- the background of structural modeling in **Petrel**
- key differences among model styles
- the broad modeling workflow in **Petrel**

Introduction to subsurface modeling



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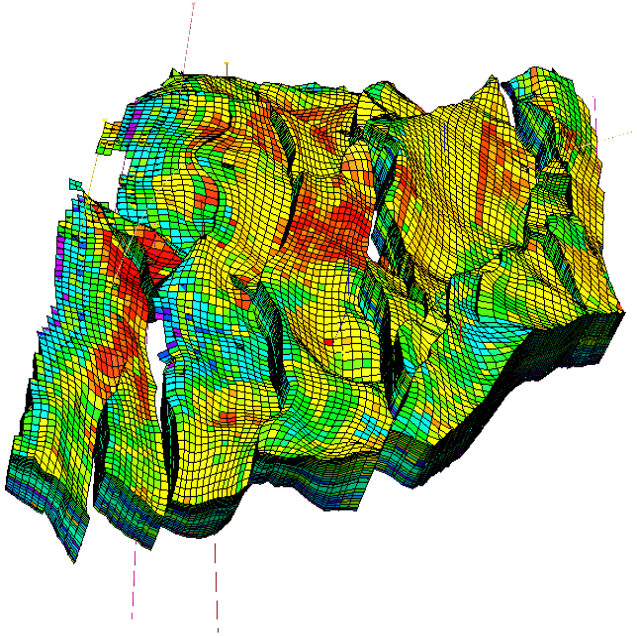
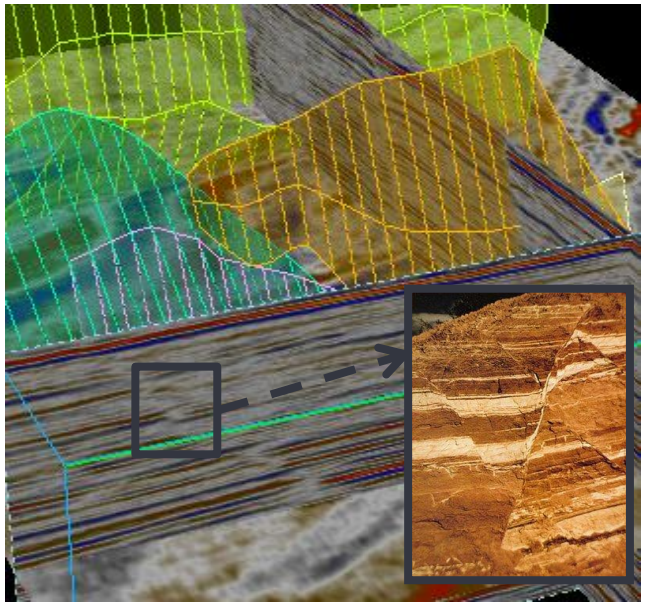
Why am I doing this?

Frame the study up front with all domain stakeholders to guide model design decisions.

Why am I doing this?

- A model is a representation of some aspect of the reality.
- The purpose of a model is to help understand, describe, or predict how a reservoir behaves in the real world. You explore a simplified model representation of the reservoir.





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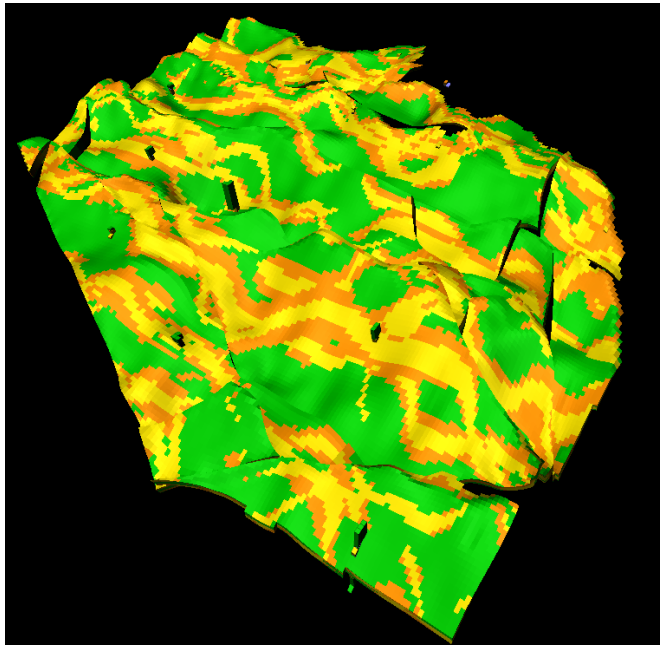
Construction of subsurface models

The goal of the model creation process is to simplify reality while you integrate available data and capture the key static or dynamic elements of a petroleum system.

- Integrates available subsurface data.
- Represents the subsurface geological features.
- Captures key static and dynamic element of the system.
- Implements your conceptual model of the system.
- Helps estimate oil and gas reserves.



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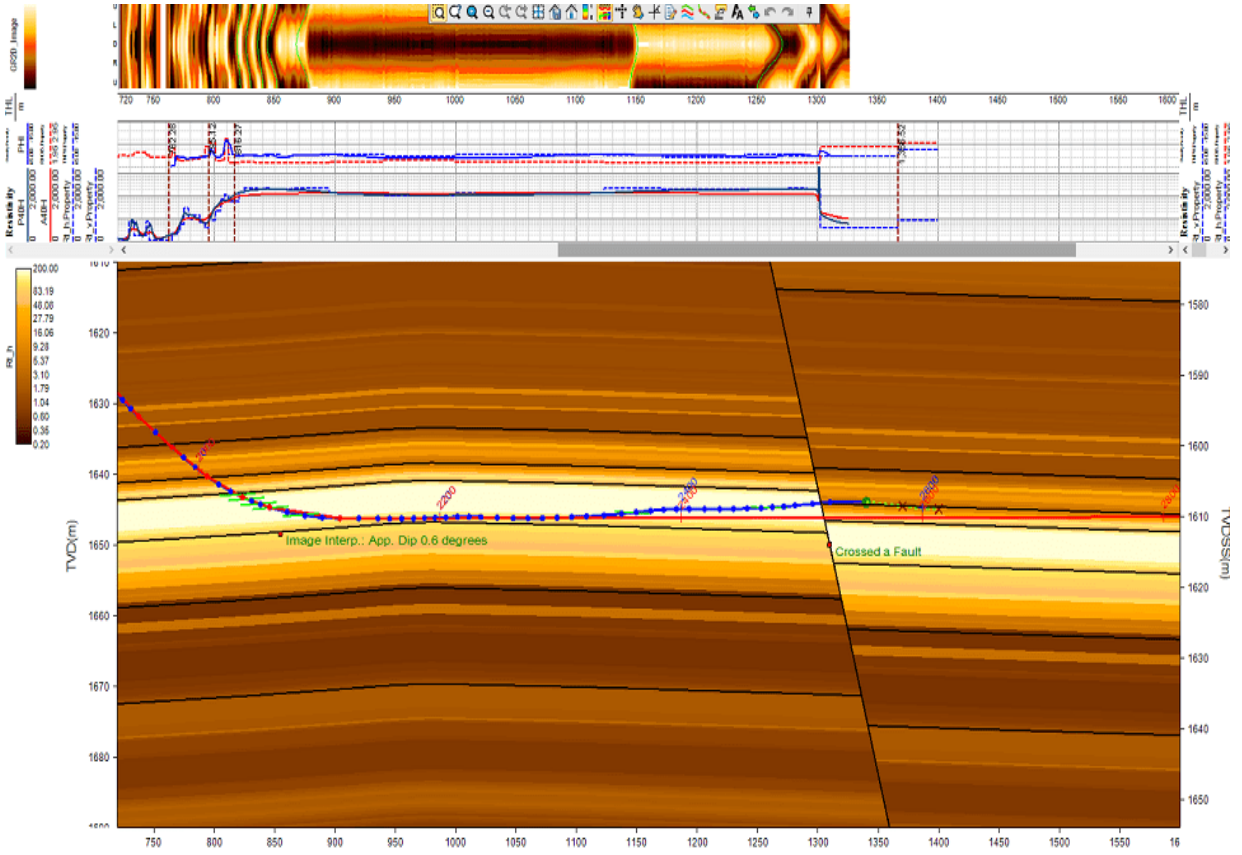
Type of subsurface models and workflows

- Geological models
- Reservoir engineering (RE) models
- Geomechanical models
- Drill and well planning models
- Exploration models
- Geoscreening



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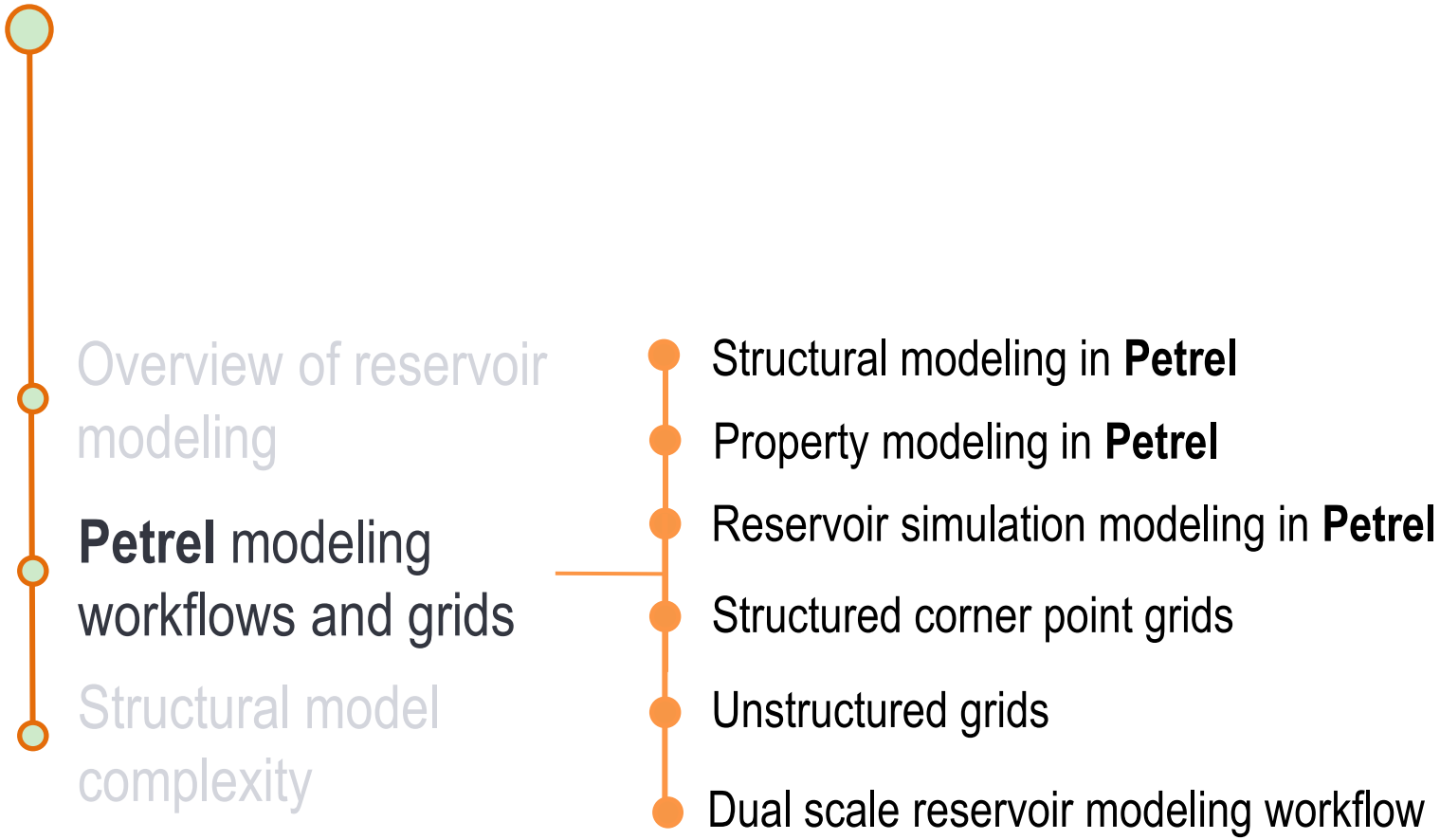
Introduction to subsurface modeling



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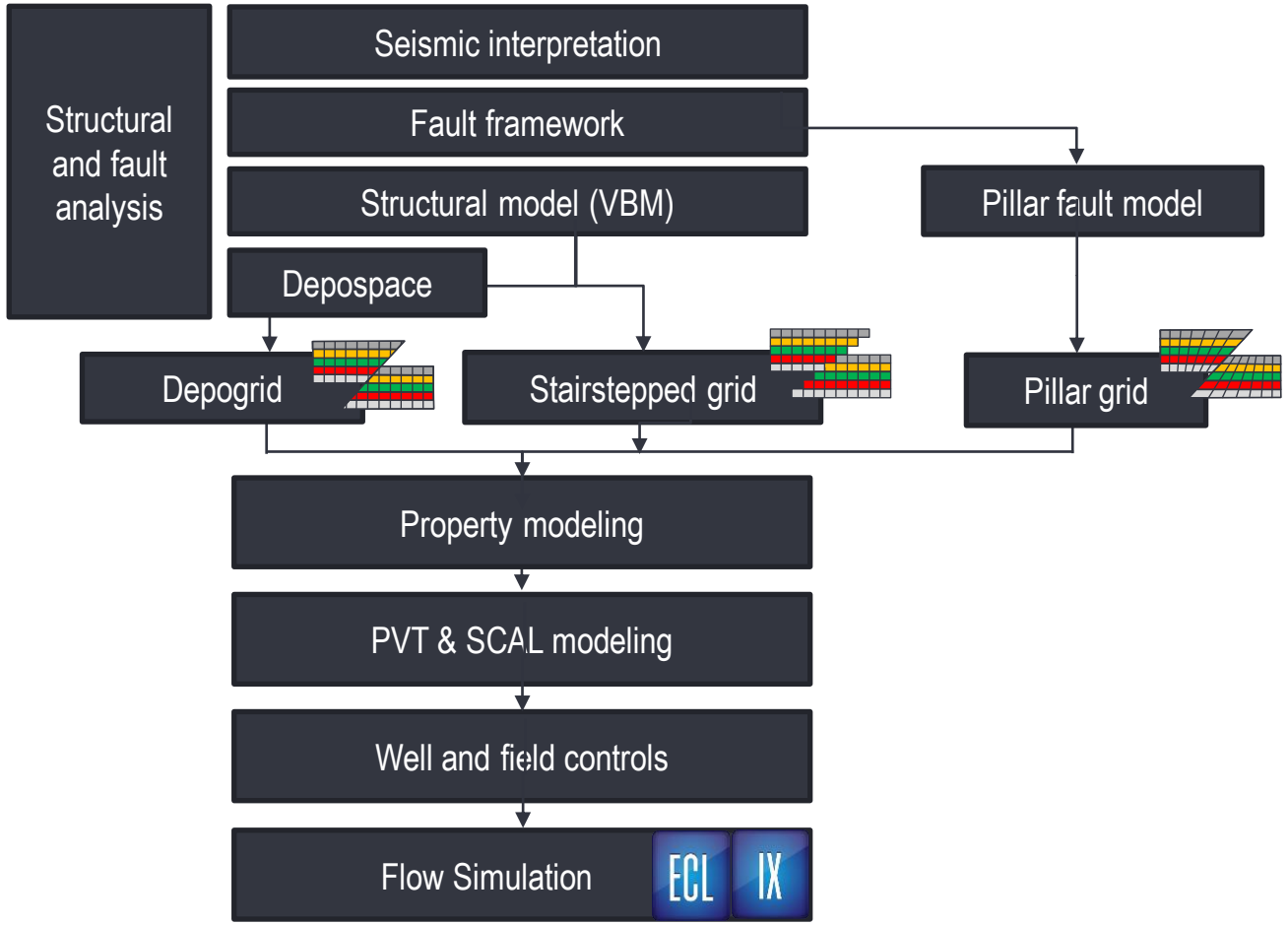
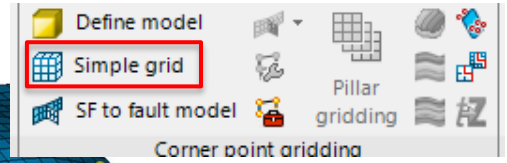
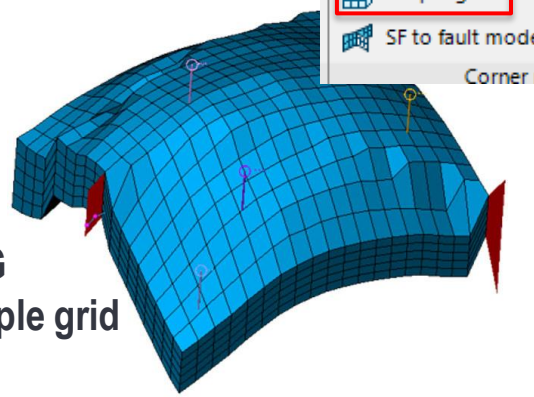
Petrel modeling workflows and grids

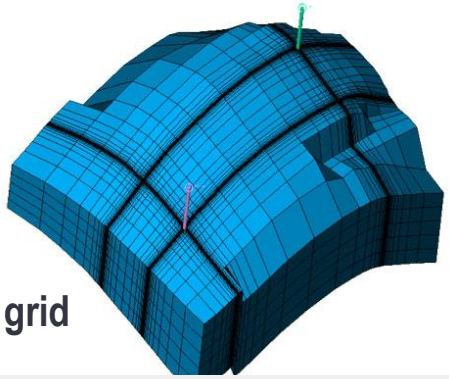


Grids you can build in Petrel

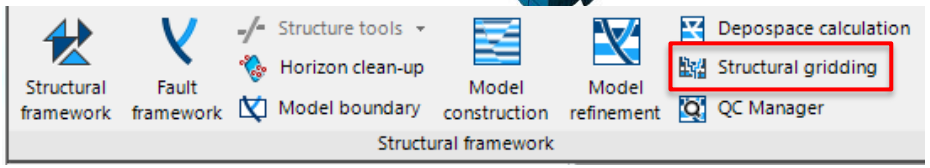


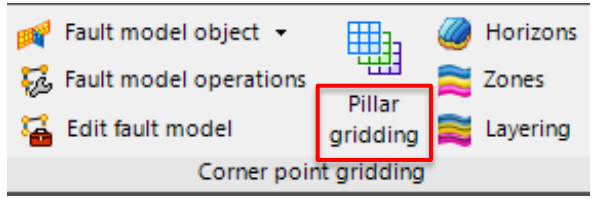


CPG
Simple grid

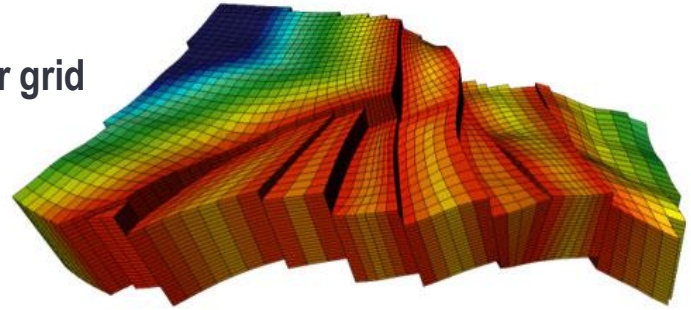


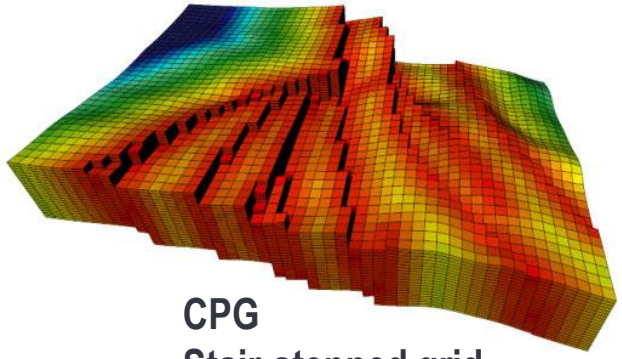
CPG
Tartan grid





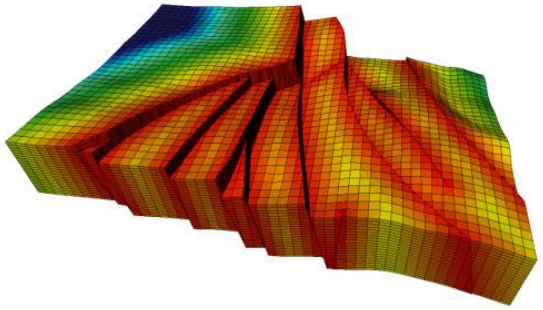
CPG
Pillar grid





CPG
Stair-stepped grid

UCCG
Depogrid



CPG – corner point grid
UCCG – unstructured cut-cell grid

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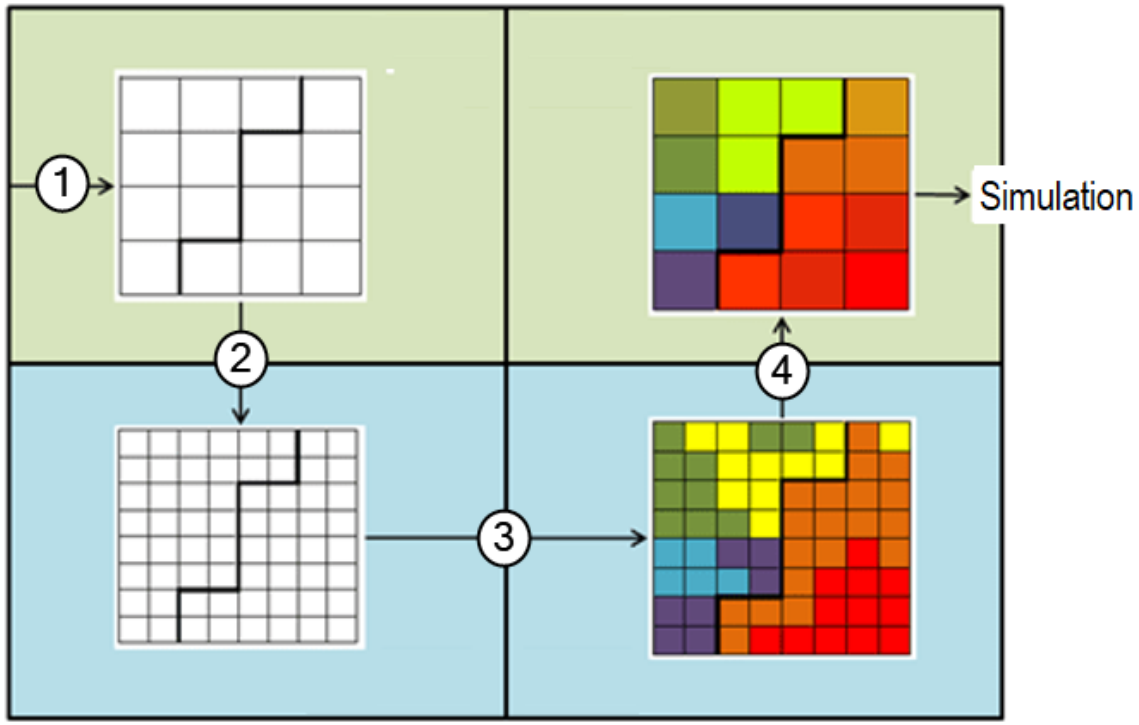
Dual scale reservoir modeling workflow



High resolution

Low resolution

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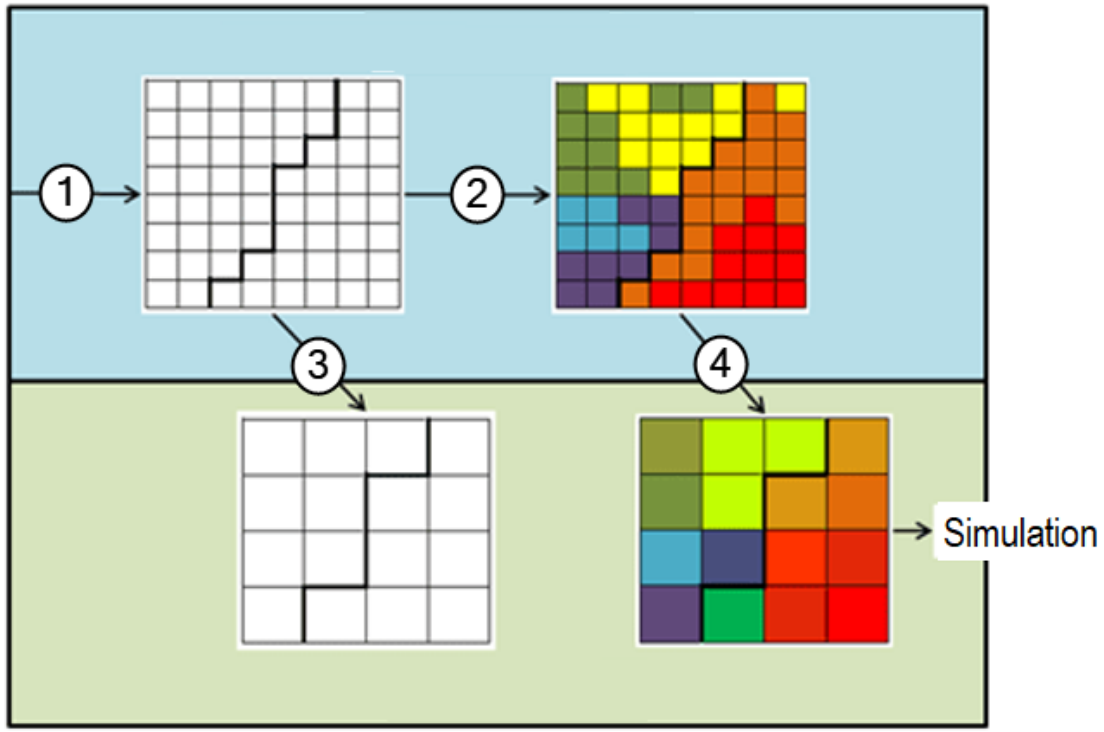
Traditional modeling workflow



High resolution

Low resolution

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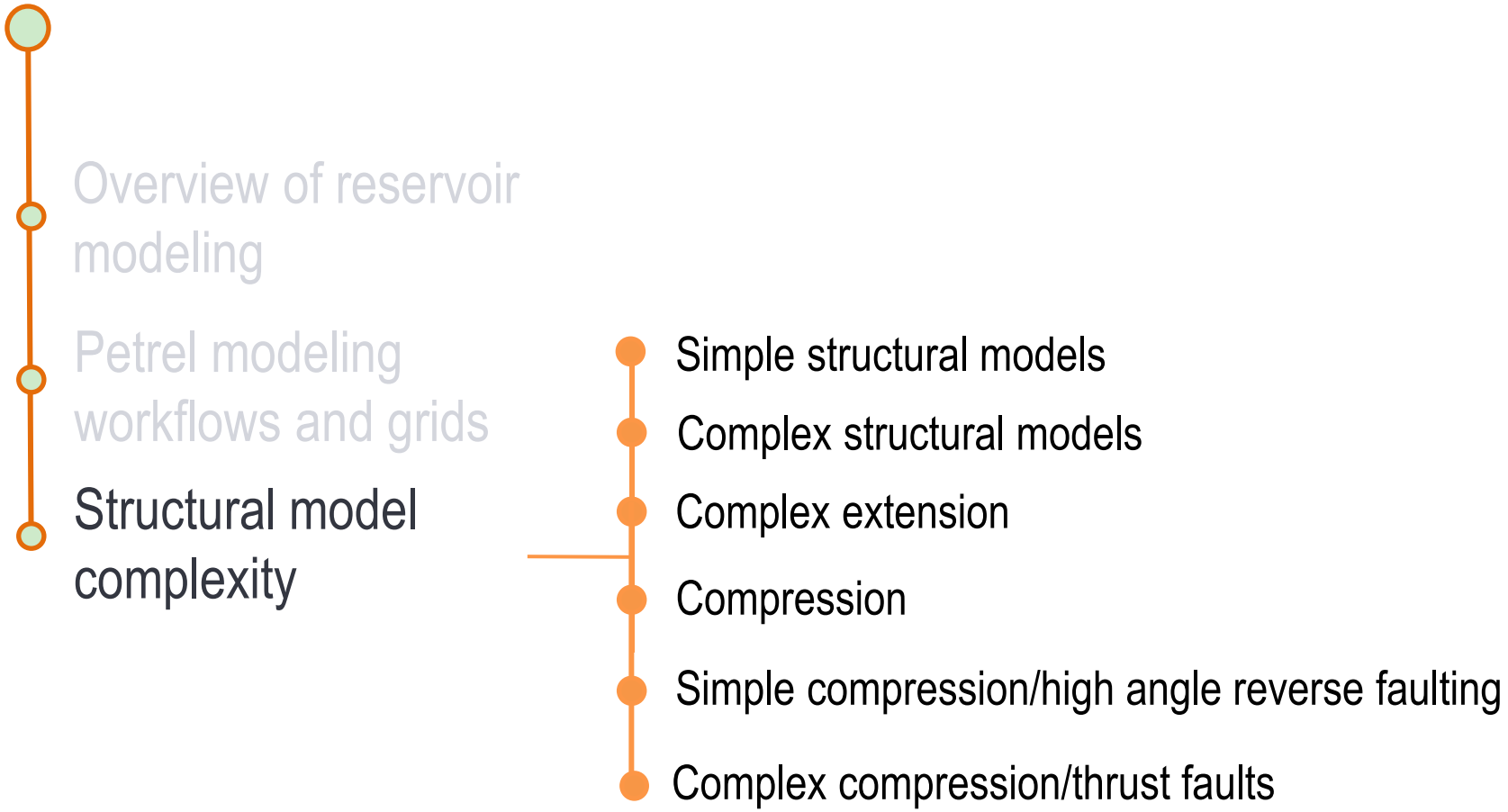
Introduction to subsurface modeling



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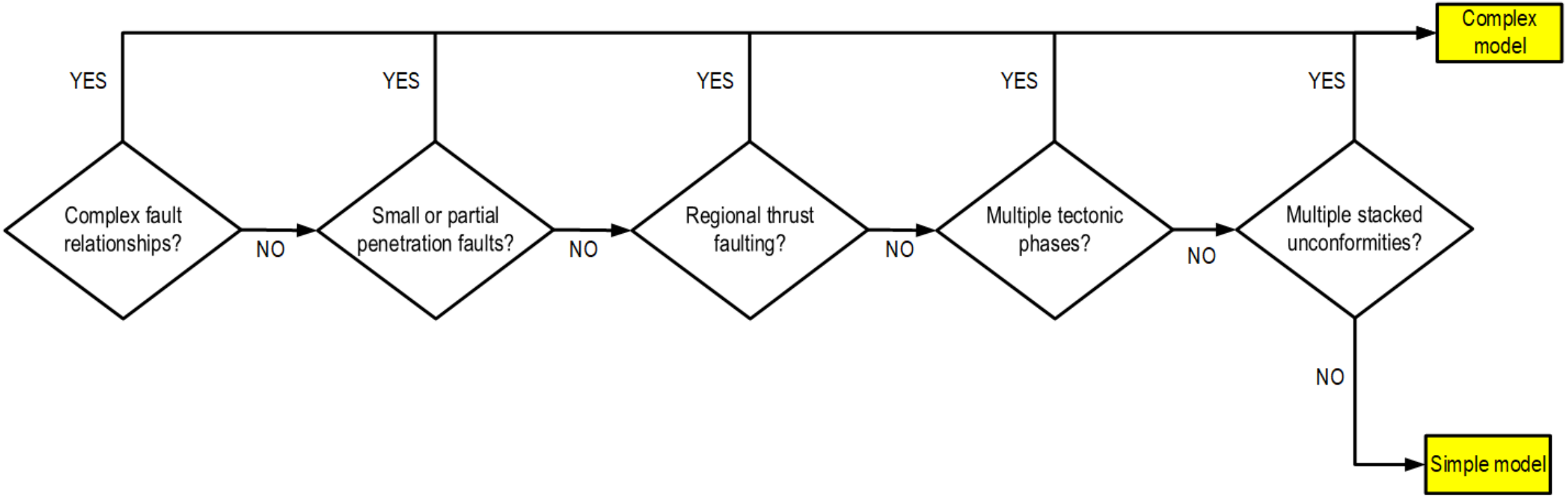
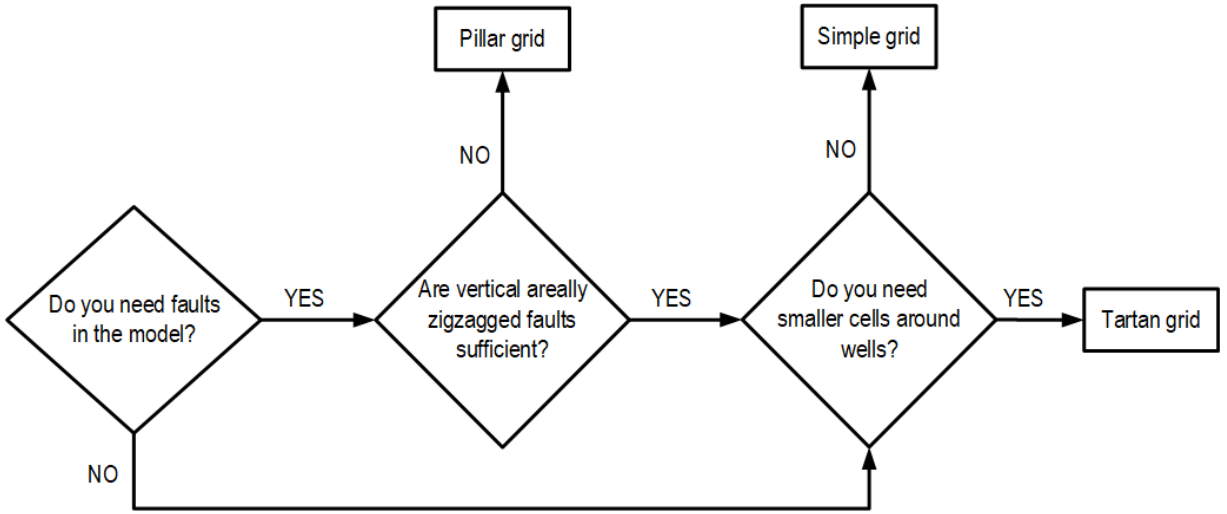
What sort of model: complex or simple? (1)

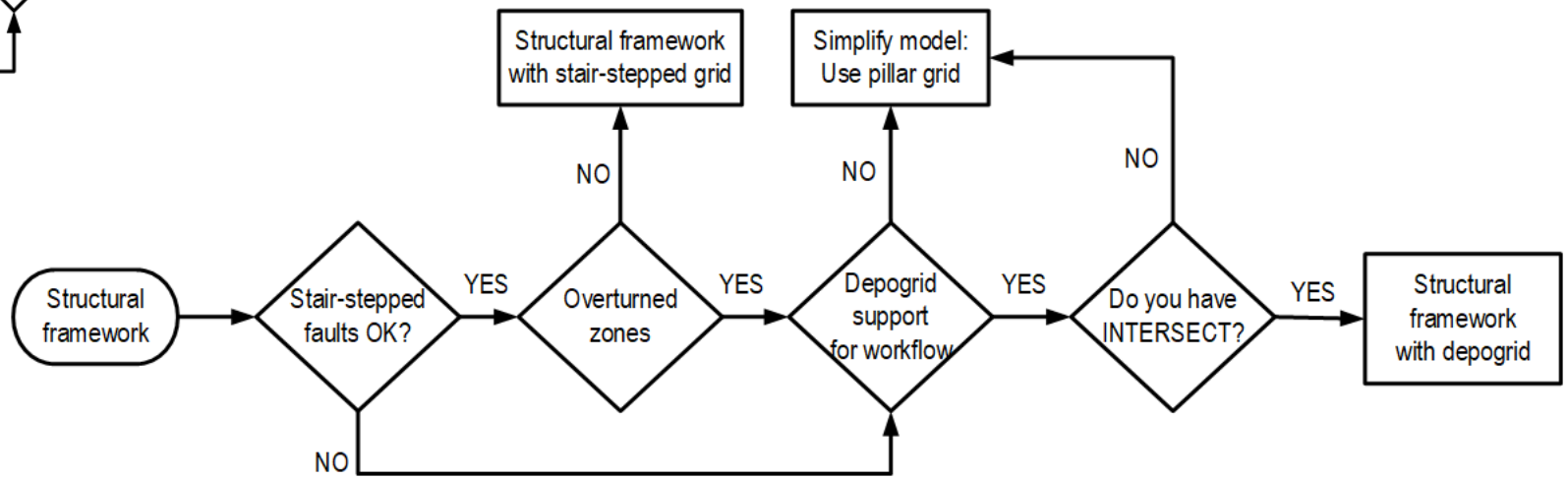


What sort of model: complex or simple? (2)

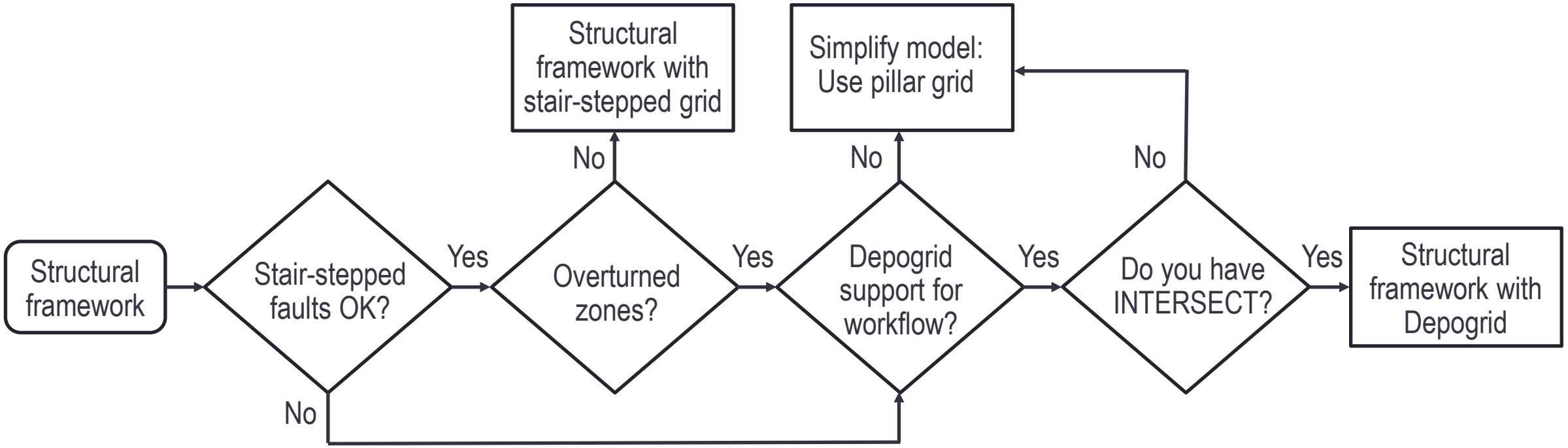


Workflow for simple grid models

Workflow for complex grid models



What type of model: complex or simple? (3)
Workflow for complex grid models



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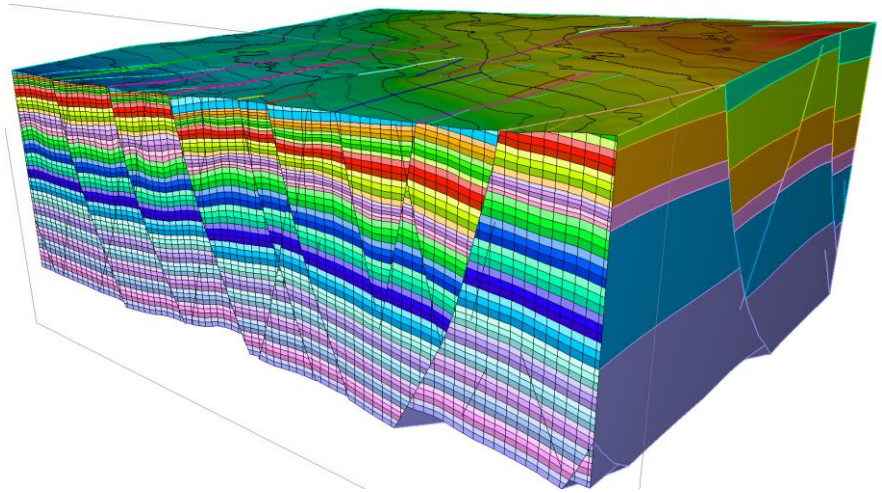
Complex extension/Complex compression

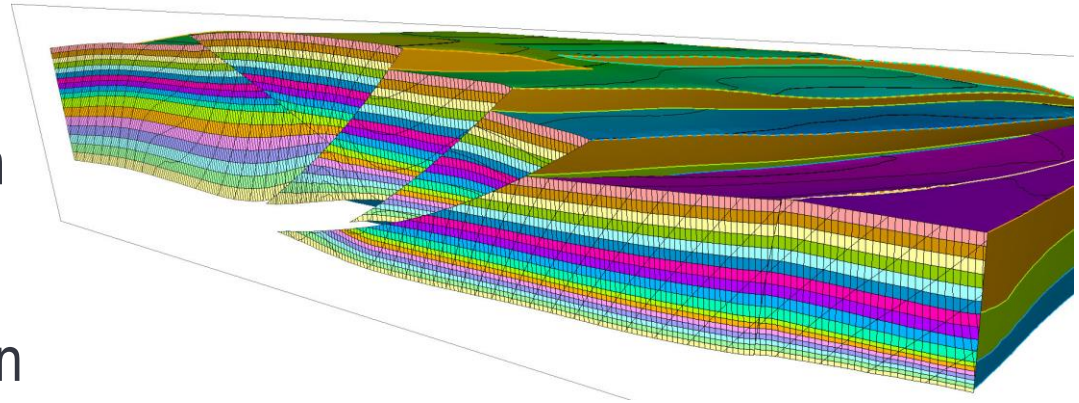
Complex extension:

- Large number of faults
- Multiple phases of deformation
- Crossing faults



Complex compression:

- Low angle, thrust faults
- Significant crustal compression
- Folded horizon geometry
- Large stratigraphic juxtaposition



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Summary

In this module, you learned about:

- subsurface modeling
- key differences among model styles
- the broad modeling workflow in **Petrel**

Learning game: Introduction to subsurface modeling (1)

Instructions:
There are several questions.
Select the correct answers.

Learning game: Introduction to subsurface modeling (2)

In which of the reservoir modelling workflows listed below is a geocellular grid used?

a. Geoscreening, well placement

b. Fault seal analysis, exploration

c. Both a. and b. are correct

Learning game: Introduction to subsurface modeling (3)

Which characteristics of your reservoir can help you determine if you have a complex model or simple model?

a. Complex fault relationships, small partial penetration faults, regional thrust fault
b. Multiple tectonic phases, multiple stacked unconformities
c. Big amount of faults, long penetration faults
d. Both a. and b. are correct
e. All the answers above are correct

Learning game: Introduction to subsurface modeling (4)

What types of grids are well suited for structurally simple models?

a. Simple grid, Tartan grid, Stair-stepped grid

b. Simple grid, Tartan grid, Pillar grid

c. Simple grid, Tartan grid, Depogrid

d. Both a. and b. are correct