

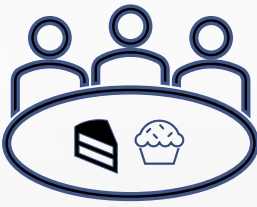
Cake & Discuss The Structural Framework

Organization Committee

Sonja Kuhlmann

Marine Seignole





HSE



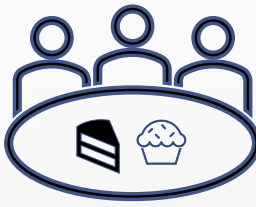
Welcome to “Cake & Discuss”

- 13 April: The Structural Framework
- 22 August
- 7 November

Session 2
The Grid Build

Session 3
The Property Model

Session 4
The Uncertainty Study



Welcome to “Cake & Discuss”

- Fundamental spirit of FORCE
 - Cooperative forum
 - Facilitate cooperation within the industry
- Group discussions
 - Discussion based on impulse talk
 - Small group: Mix of experience and expertise
 - Summary session



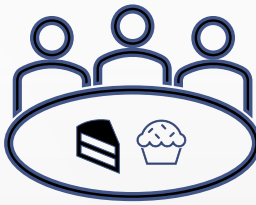


How this works

- Divide audience into groups
- Get to know your group
- Each group chooses a discussion keeper
- “Impulse” talks round today's topic
- Discussion time after talk
 - Have you seen this?/What's your best practice?
- Round the room: each group present findings (first round introduce your group)
- In total 3 impulse talks and follow-up discussion in groups and presentation to other groups
- Closeout and time to mingle and talk
- Enjoy food and drinks throughout the afternoon



Time	Duration	Activity
12:30-13:00	30 min	Sort groups Intro to concept Guidelines
13:00-13:05	5 min	1. "Impulse" talk
13:05-14:00	30 min 20 5	Group discussion – know your group Presentations (people and topic) Overall discussion
14:00-14:05	5min	2. "Impulse" talk
14:05-14:45	40 min (20+15+5)	Group discussion Presentations and overall discussion
14:45-14:50	5min	3. "Impulse" talk
14:50-15:30	40 min(20+15+5)	Group discussion Presentations and overall discussion
15:30-15:50	20 min	Closeout / feedback

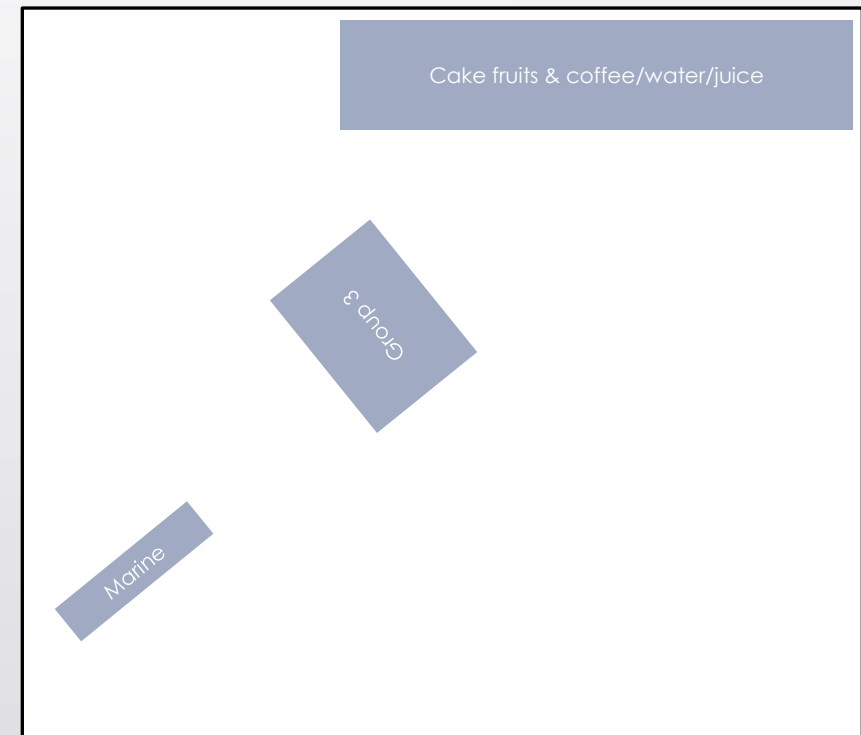
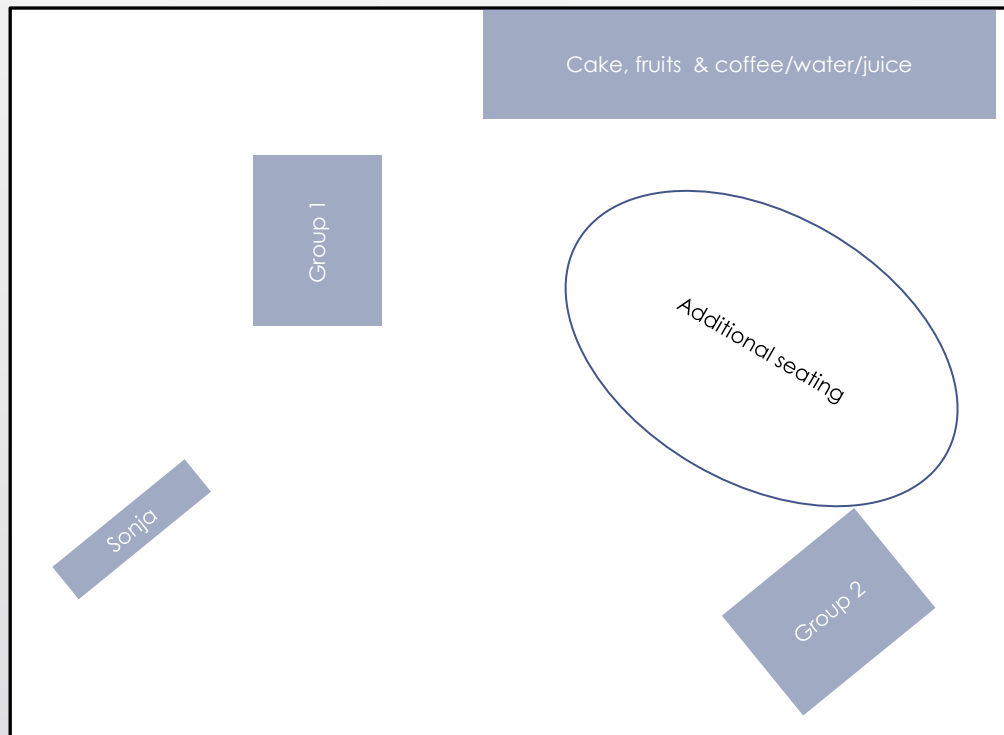


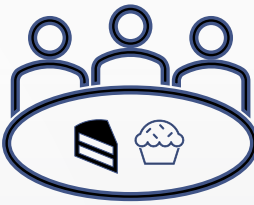
The groups

Group 1	Group 2	Group 3
Carlos	Andreas	Artem
Geraldine	Chris	Fredrik
Santiago	Eirik	Natalie
Øystein	Jens Martin	Piotr
		Sarah



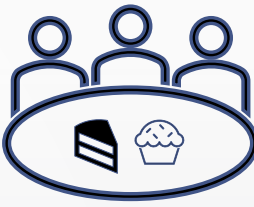
The groups





Choose a discussion keeper

- Role:
 - Make sure everybody in the group gets talking time
 - Time keeping
 - Make sure the key ideas are on the flip chart
 - Find a presenter to other groups- 1 presenter per impulse talk
 - When problems are raised
 - -> probe for solutions
 - -> keep the discussion going
 - TAKE A PICTURE OF YOUR FLIP CHART and BRING IT
 - Send it to Sonja.Kuhlmann@conocophillips.com



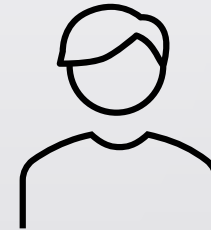
Impulse talk 1



What is a clean interpretation?



The seismic interpretation is ready. How fast can you build a geomodel?

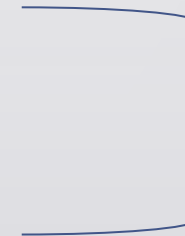
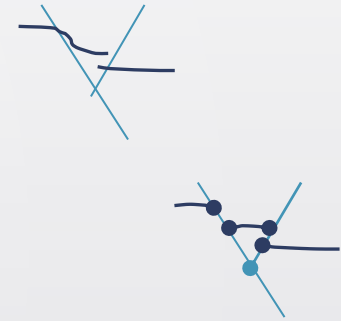


Ready?
Is it cleaned up?

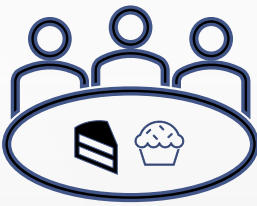


Definitions

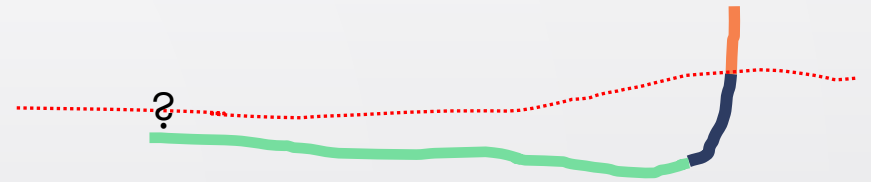
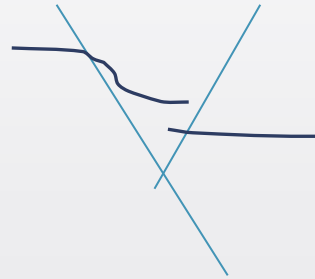
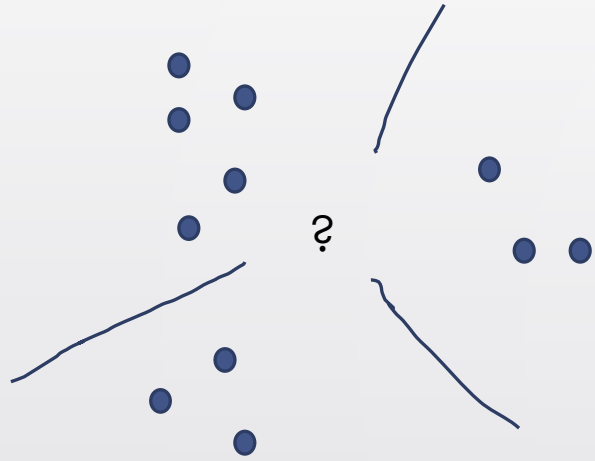
- Seismic Interpretation
 - “Unconstrained” horizon and fault interpretation
- Structural Framework
 - Constraint = “water tight” horizon and fault interpretation
 - Just the constrained fault interpretation is referred to as fault framework
 - Fault-fault-interactions and horizon-fault-interactions clearly defined
 - Minor (non-seismic) horizons are within the space defined by the major (seismic) horizons, e.g., not crossing
 - Fault throws are consistent
 - Geometries approximated and described by surfaces
 - Well based structural framework; horizons and faults fit with the well top and zone logs hence the well paths are in the correct zones and are on the correct side of a fault
- Geogrid
 - Fine scale approximation of structural framework with grid cells
 - Some geometry limitations might come with software choice
- Simulation Grid
 - Coarse scale approximation of structural framework/geogrid with grid cells
 - Additional geometry limitations might come with software choice



Could be common dimension



What is a clean interpretation?





Discussion points

- Who is doing the interpretation
- Sequential vs integrated
 - Seismic independently from thickness-based horizons?
- How far to go back if finding inconsistencies?

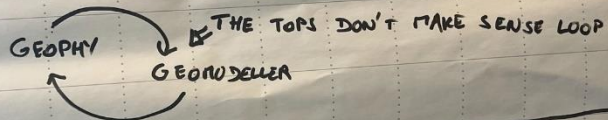


Group 1 - Notes

WELL TOPS

- ⊖ LITO TOPS vs AI TOPS } AGREE
↳ geomodeller vs geophy tops } TOPS
AND UNDERSTAND
SEISMIC
LIMITATIONS

NEED A DISCUSSION
INTERPRETATION STRATEGY
GEOMODEL BUILD STRATEGY



GEOPHYSICIST TO BUILD STRUCTURAL FRAMEWORK

- clean interpretation
- good linkage of faults
- ⇒ avoid geomodeller "guess" to fix the interpretation

RMS vs PETREL

RMS preferred for complex structures

Issues with Petrel

- Trial/errors - crash
- Pillar gridding - Take time to fix faults

DOCUMENT THE WORK DONE

Model rebuild from scratch because lack of documentation / understanding of what has been done before.

Depends from company to company.

Petrel project + Workflows + Report

↓
CLEAN!

WHEN DO U UPDATE ? REBUILD

- New data (seismic/wells)
- The existing model doesn't allow to predict production any more



Group 3 - Notes

IMPULSE ①

INTERPRETERS → HANDOVER TO GEOMODELLER

↳ MULTIPLE ON LARGE FIELDS
Same person doing horizon & fault interpretation ??

Continuity

LOOP: FEEDBACK BETWEEN GEOPHYSICIST/MODELLER

↳ HOW SHOULD MANIPULATION BE DONE & BY WHO

PURPOSE

↳ Exploration/development/drilling
↳ More detail: Geomodeller with input from Interpreter

CONTINUITY & ALIGNMENT

INTERPRETER SHOULD HAVE CONTROL

UNDERSTANDING LIMITATIONS - WHAT WILL BE
PROBLEM AREAS FOR GRIDDING

SUMMARY

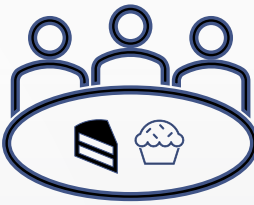
Throughout project life cycle
Every project different - decide on methodology

- BEST PRACTISE: COLLABORATION

INTERPRETER HAVE OWNERSHIP OF STRUCTURAL FRAMEWORK

GEOMODELLER COMMUNICATE LIMITATIONS

PROPOSALS: INVOLVE SPECIALISTS i.e. structural geologists/seis
DON'T FORGET OTHER DISCIPLINES @ RE



Group 2 Notes

Clear interpretation.

- Internal interpretation course
 - ↳ Fit for modelling
- Interpretation resolution
- Structural concept interpretation
- Discipline integration

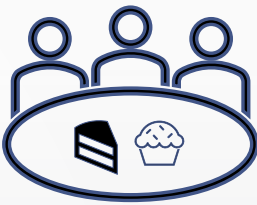


Impulse talk 2



How complex should my fault model be ?

- Geological model vs reservoir model
- Impact of simplification?
 - Positive
 - Negative
 - Mitigation



Group 3 - Notes

Geo model → more faults

- Concept
- Communication
-

Resmodel → less structure

- Flexible
- Not needed (?)

- FIT FOR PURPOSE
- Timeline

Simplification

less

More

+ Communicate complex

Flexibility
Efficiency

- Could communicate
certainty

- Rigid

- Time consuming



Group 2 - Notes

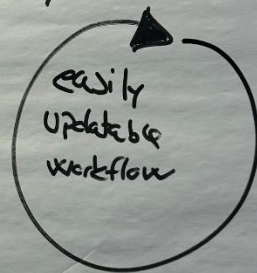
MODEL COMPLEXITY

Fit for purpose

Start quick & dirty

↓
Learn
↓

Refine





Group 1 - Notes

Complexity: Fit for purpose
... or Pillar gridding!?

- Property faults vs. structural fit
↳ throw
- Clean/proper fault vs. pseudo fit
to get out of an impossible situation.

• Naming convention (of fits.)
to keep track of origin
and/or purpose

- Are RE's ever happy?
 - run time
 - complexity.

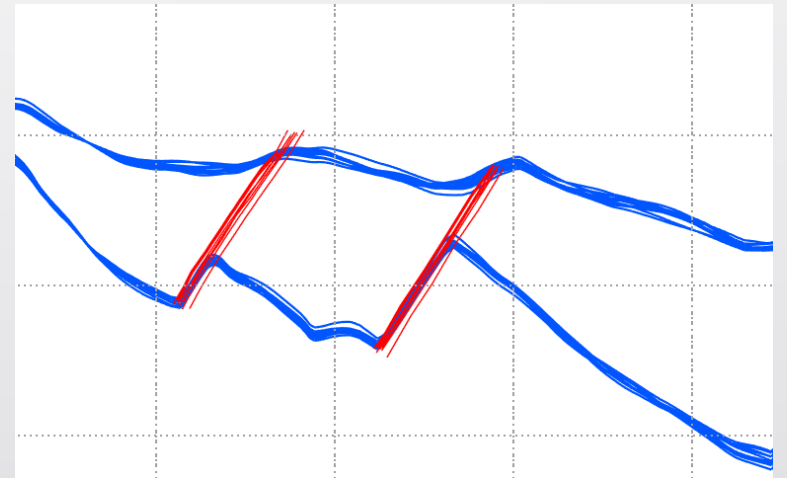


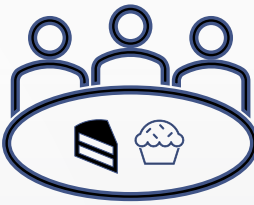
Impulse talk 3



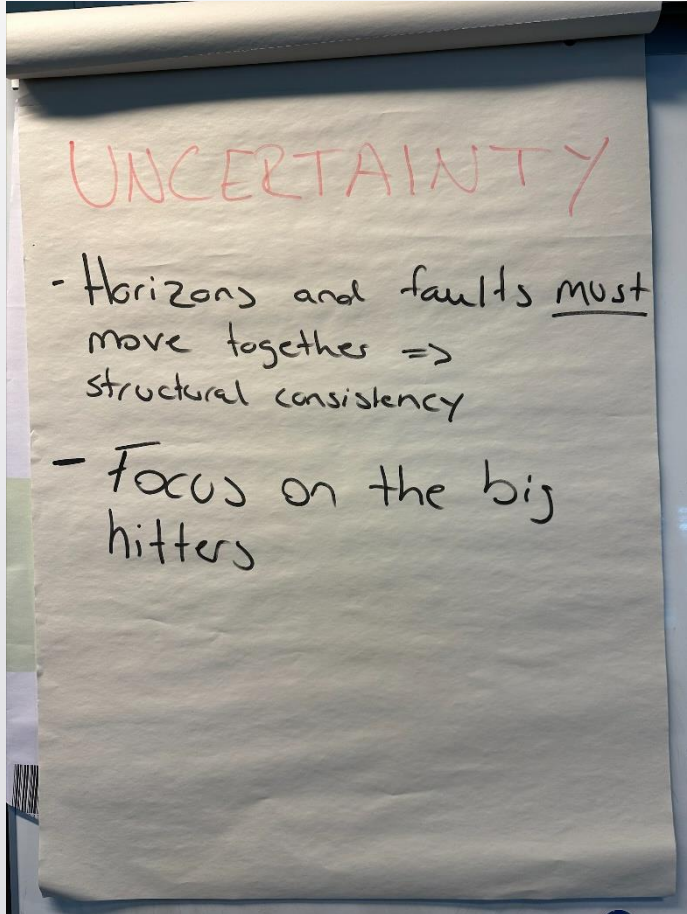
Structural uncertainty discussion point

- Horizons
 - Several interpretation
 - Stochasticity around one work case
- Faults
 - Fault placement
 - Uncertainty around it
 - Interaction between faults and horizons
- Velocity model





Group 2 - Notes

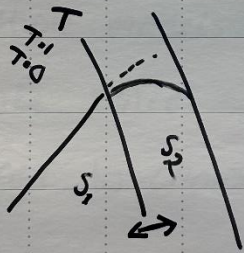




Group 3 - Notes

Structural unc

- more difficult if there are different structural models
- several stochastic models with different probabilities



- large unc on prospects
- unc on top/base

- how to handle it if you have two different data sets \rightarrow resulting in two different models
- \rightarrow an AVG model across two or multiple models might not make sense

\rightarrow need to choose structural concept

- is there any software that can handle both ^{horizon} dept shift/lateral fault shift and fault tilt?

- how complex unc. workflow is needed

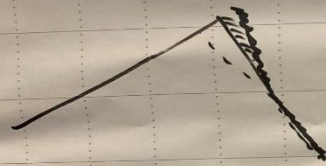
- survey unc.



Group 1 - Notes

Uncertainty.

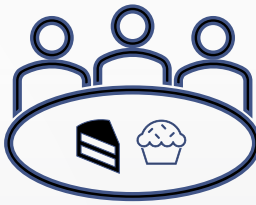
- How to face the challenges of the zones near the fault?



- Different models
- Grids properties
- Different grids.
↑ HC ~ MC ↓ LC

• Surfaces

- Communication to get a good approach of uncertainty.
- Stochastic fluctuation of the surfaces and its behaviour against fault (?).
- Define what is going to be use for drill a well (Several Models, History matching. Instead different surfaces)



Feedback

- 12 forms filled-1 participant left before
- Very consistent feedback from all
- Format
 - Nice to have a chance to meet other people/expert and different challenges to solve
 - Refreshing different than 1 way dialog
 - Group size (4 -6) allow communication/ contribution from all . Better than 1 way dialog
 - Good to have the overall summary
 - Good to have topic points to discuss to frame the discussion (allow to digress but refocus)
- Session length
 - 20/30 mins discussion worked well for each topic
 - Some topics could be ½ day session on their own (e.g., fit to purpose, uncertainty)
 - ½ day enough
 - Longer hard to prioritize



Feedback

- Satellite location-> if we can . Will fit
- Suggestion of session topics
 - Fit to purpose
 - Structural uncertainty
 - Concepts and link to model
- Other feedback
 - Case study to force to identify common issues
 - Projects and solutions
 - Have follow up session with collaborative findings
 - How in the industry can we improve and share knowledge with common problems



Next dates

- 22 August
- 7 November

Session 2
The Grid Build

Session 3
The Property Model

Session 4
The Uncertainty Study