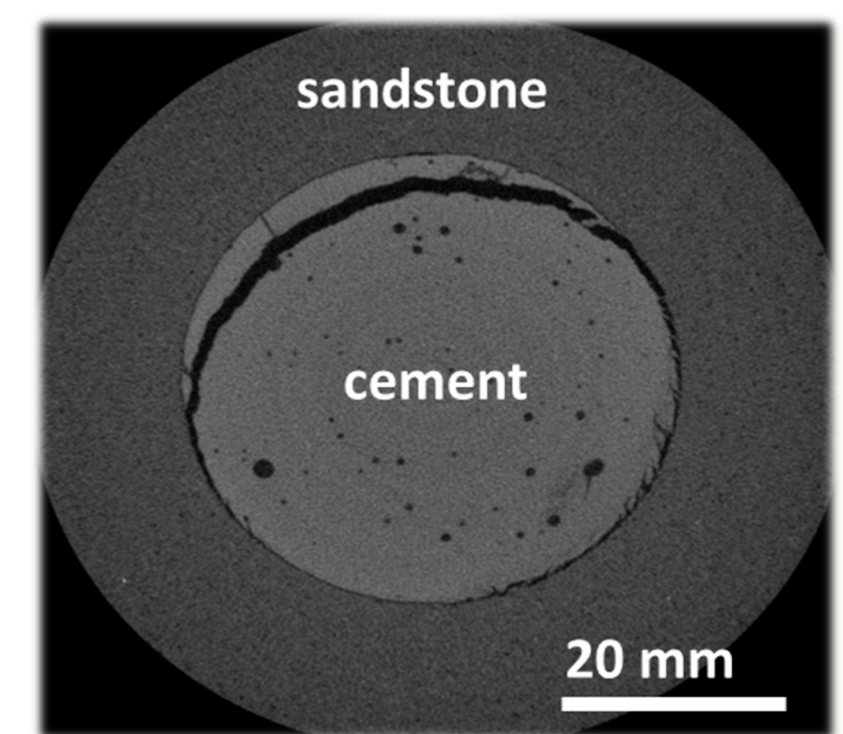
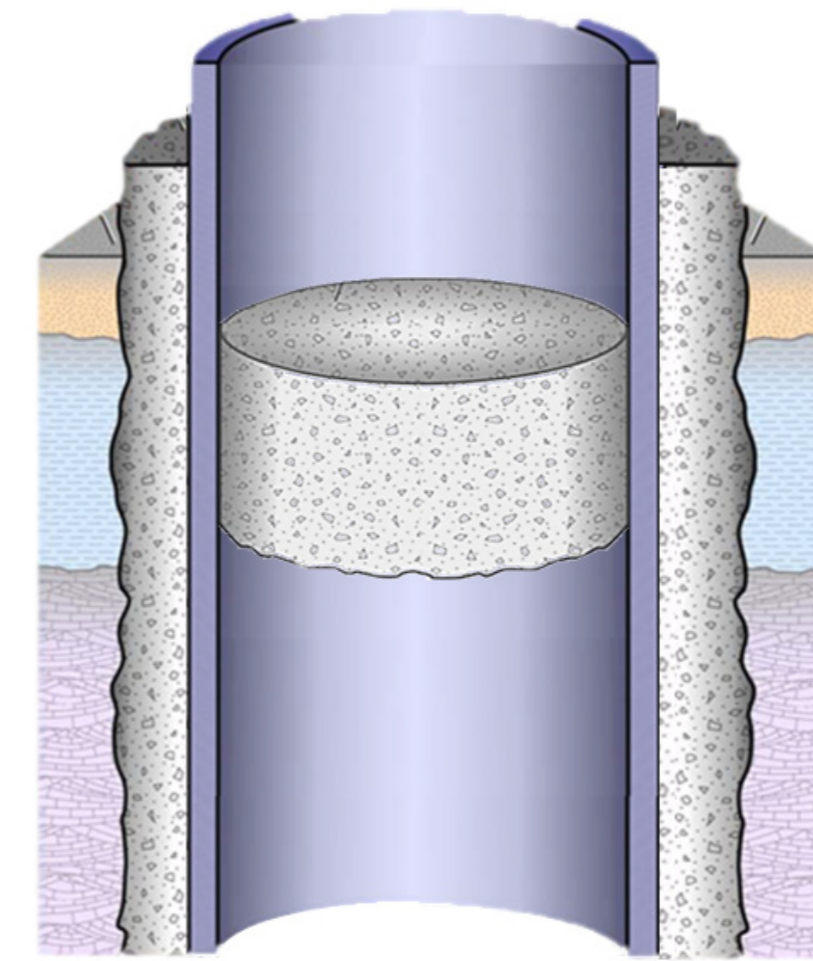


Closing the gaps in CO₂ well plugging (CO₂ plug)

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Knowledge gaps

- Which materials can best seal CO₂ wells for eternity and how long should the permanent plugs be?
- How do different plugging materials flow and solidify at pressures and temperatures relevant for CO₂ wells?
- How can we best avoid fractures and de-bonding of permanent sealant materials?



SINTEF experiment with cement plug set under relevant p & T.

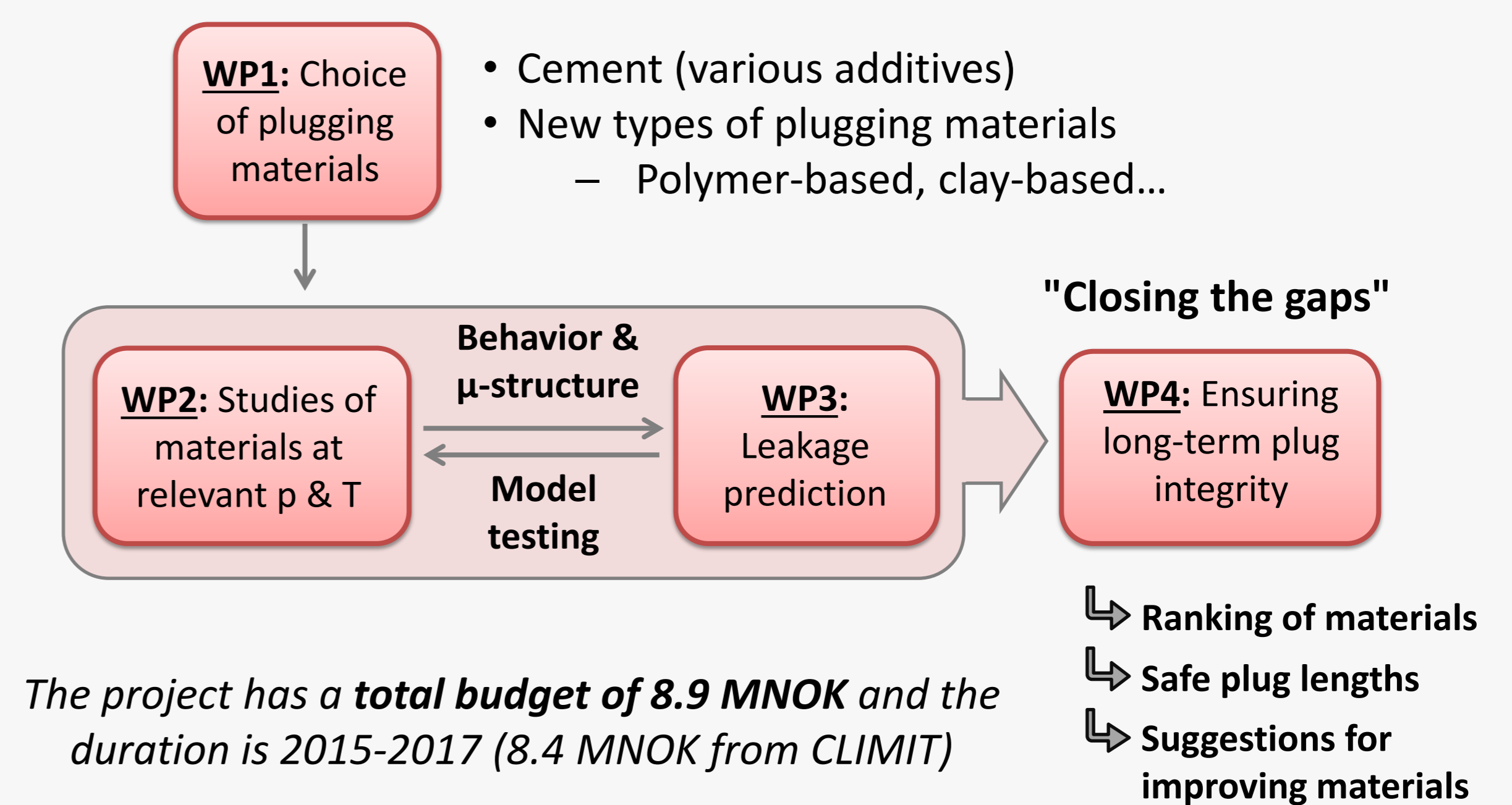
Our Researcher Project

Project goal:

Safe and cost-efficient CO₂ storage by ensuring appropriate choice of permanent plugging materials and plug lengths for CO₂ wells.

Partners:

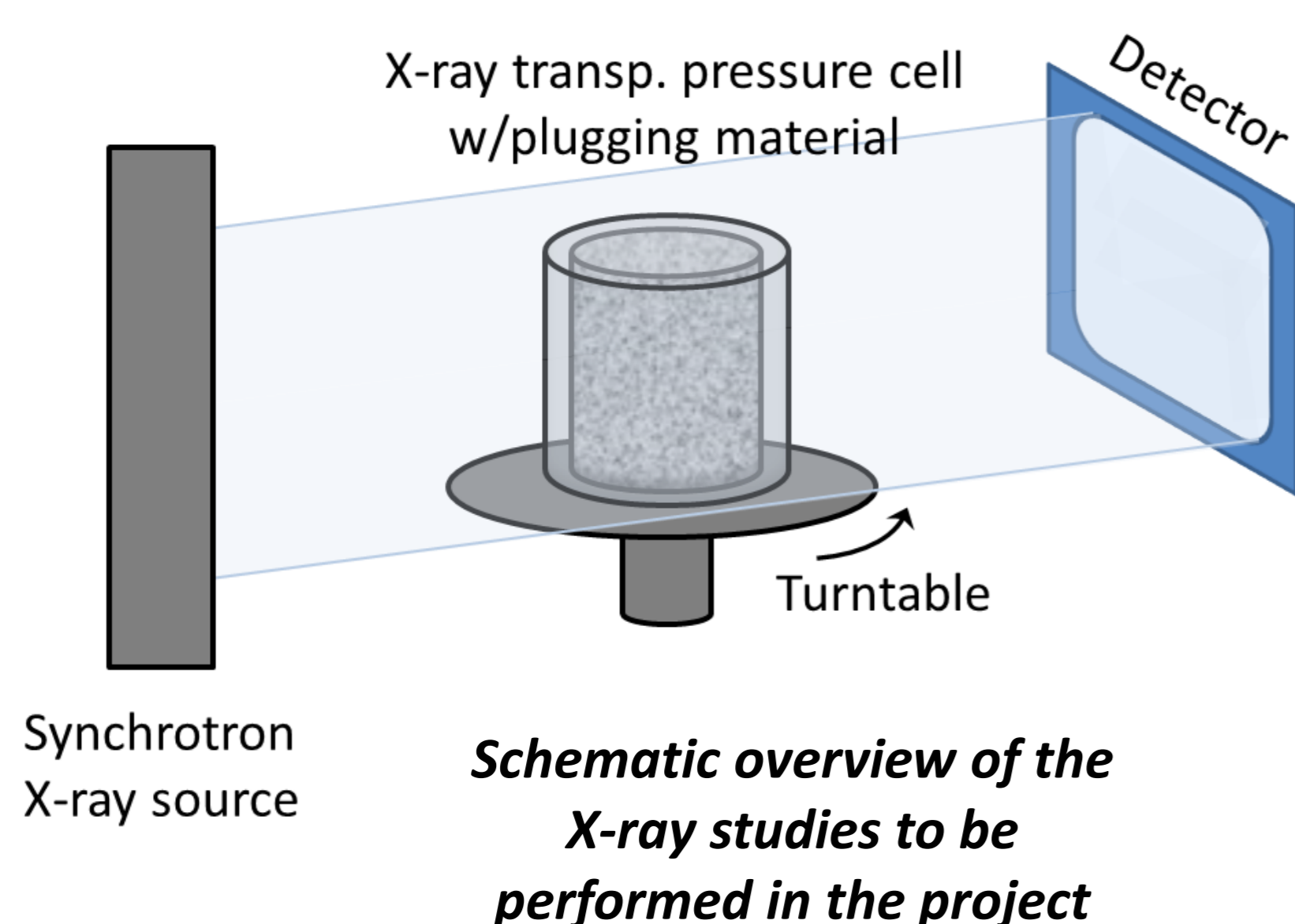
- SINTEF Petroleum Research (WP 1 & 3)
- SINTEF Materials & Chemistry (WP 2 & 4)
- Norwegian Univ. of Sci. & Tech. (Post Doc)
- France: Univ. du Maine & Curistec



Experimental plans

The aim is to study candidate plugging materials at pressures and temperatures relevant for CO₂ wells:

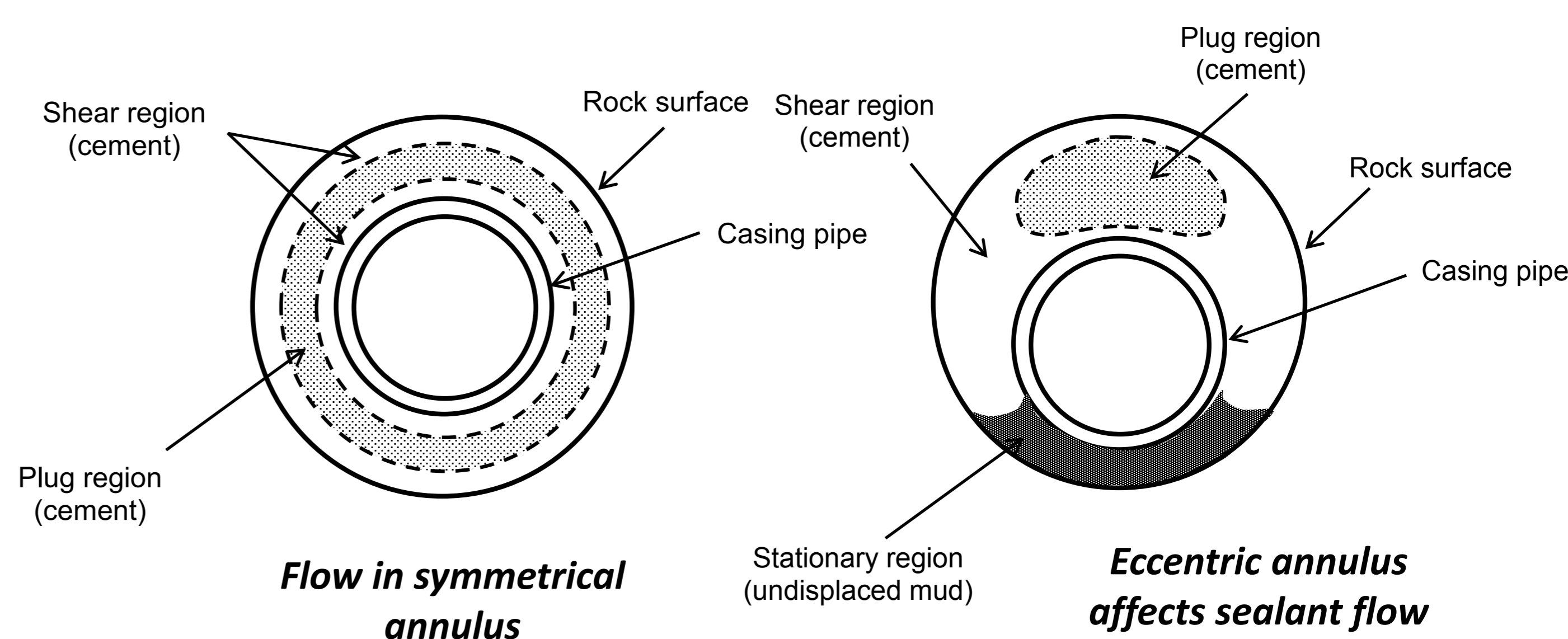
- Build a unique **X-ray transparent sample cell** that can operate at relevant pressures/temperatures and can fit within different X-ray tomography instruments. This will be used to study materials while they solidify.
- **Long-term CO₂ exposure** of candidate materials.
- **Microscopy studies** of all candidate materials.
- **Digitalize leakage paths** observed by tomography to ensure that flow through them can be calculated in the numerical part of the project.



Numerical plans

The aim is to establish models, procedures and recommendations for plugging optimization and quantitative leakage prediction. This will be achieved through development and experimental verification of models that cover several aspects of plugging:

- **Sealant placement:** Effect of casing centralization, borehole geometry and mud on placement and obtained plug quality.
- **Sealant solidification** under in-situ *P,T*-conditions.
- **Development of stresses** in sealant during setting.
- **Development of weak interface zones** near walls.



Acknowledgements:

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