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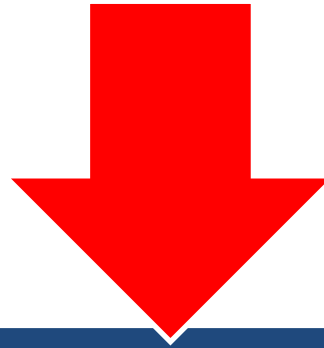
2024

SPE-221795-MS.

**Assessment of polymer resins as alternative abandonment
barrier materials for high pressure high temperature (HPHT)
wells: A multi criteria decision making approach**

**Augustine Okechukwu Chukwuemeka | James Njuguna | Gbenga Oluyemi | Suhail Attar.
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Outline

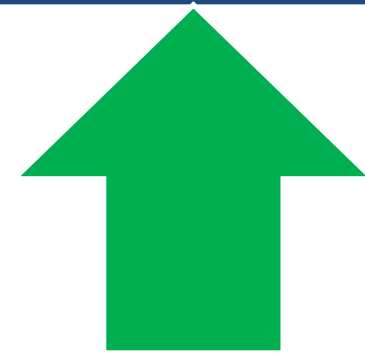


**Present P and A practices
and Barrier materials**

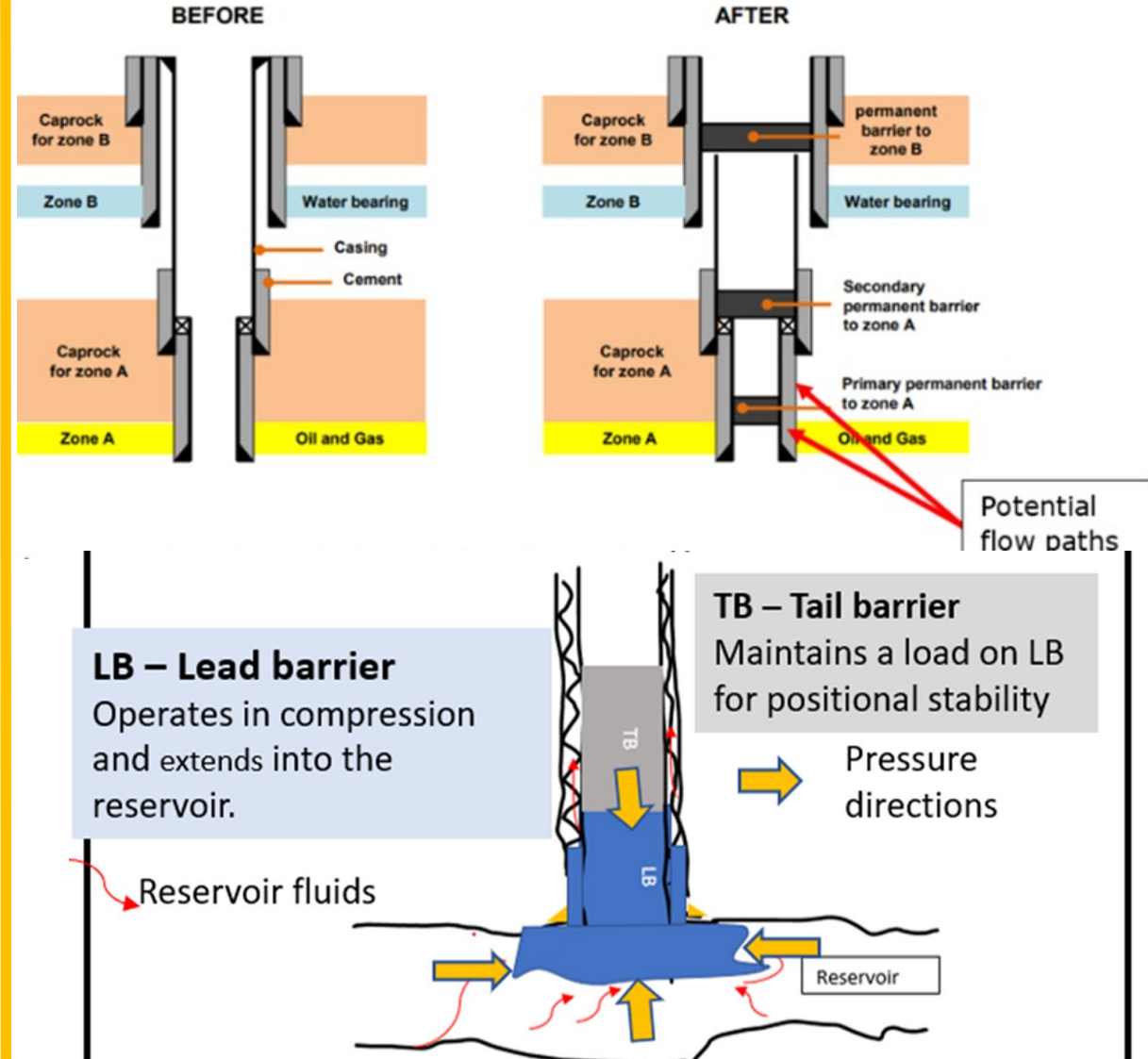
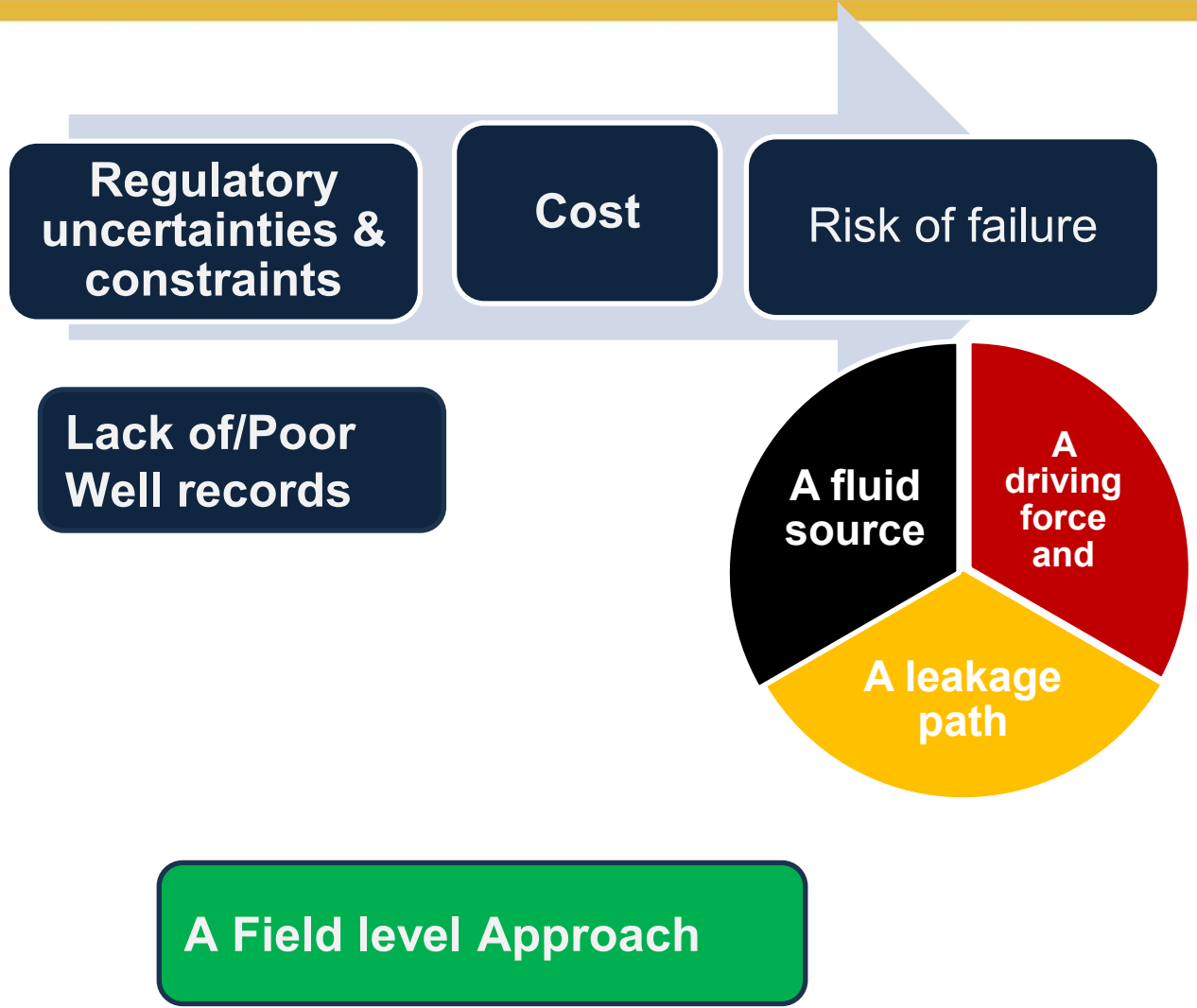
**Application of MCDM for solving emerging P
and A challenges in HPHT scenario**



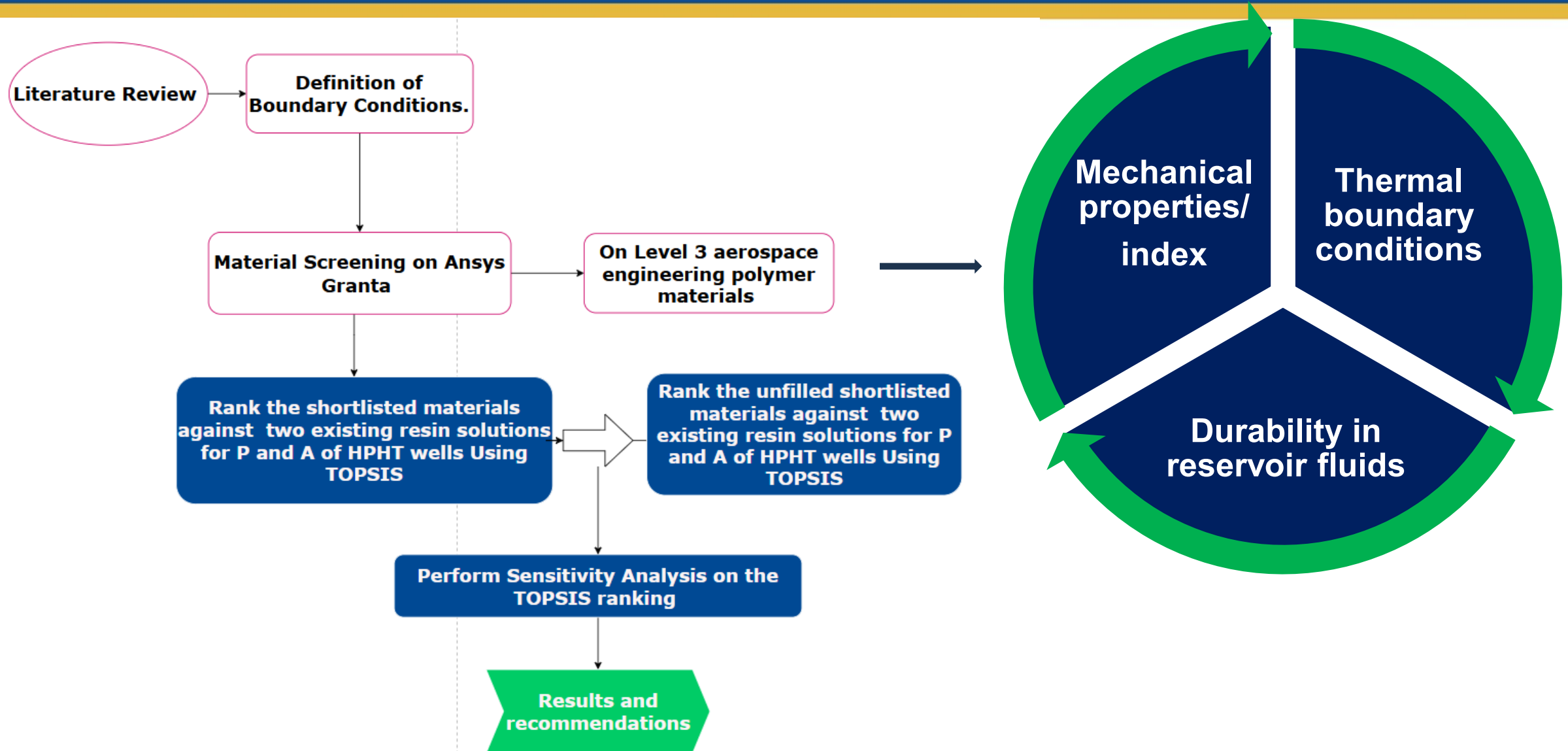
**Alternative Resin
solutions**



Present Abandonment Practices and Challenges



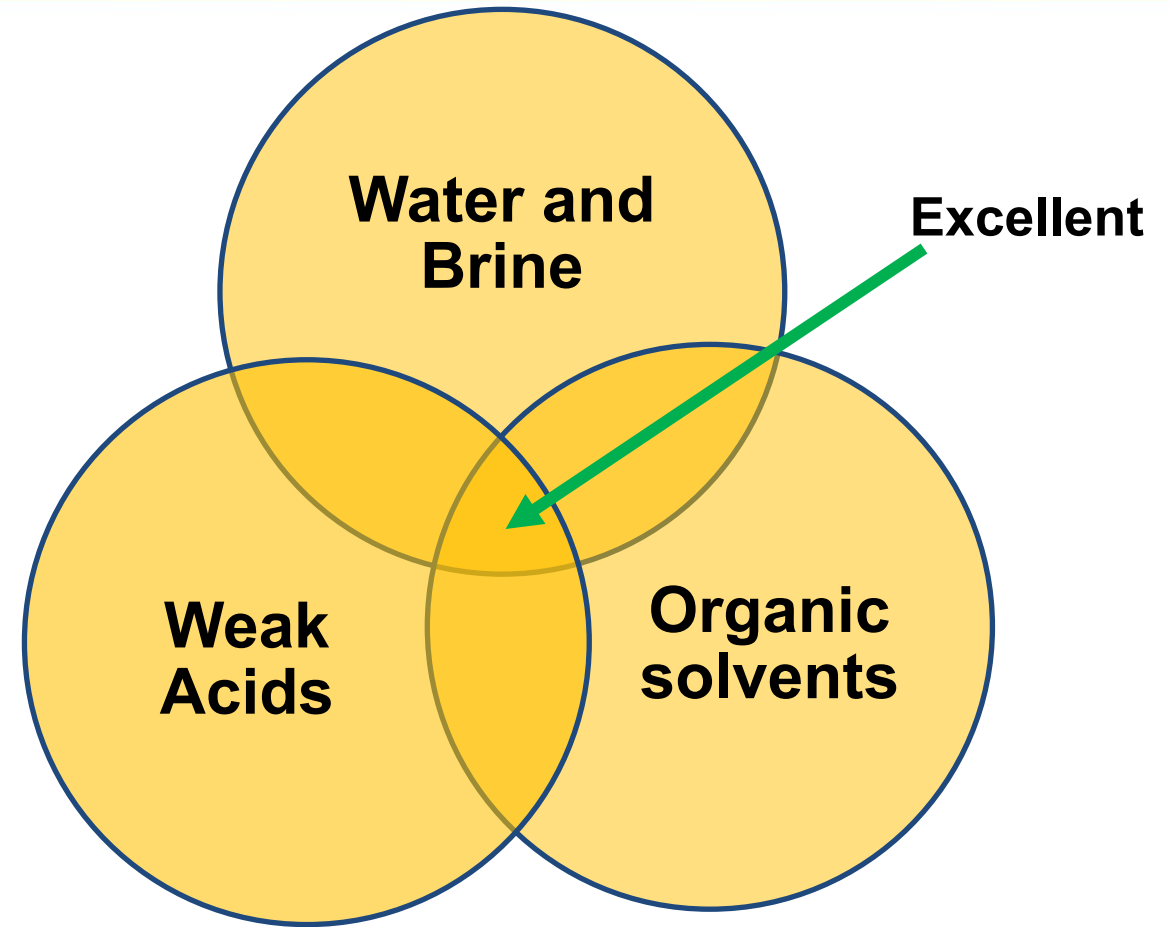
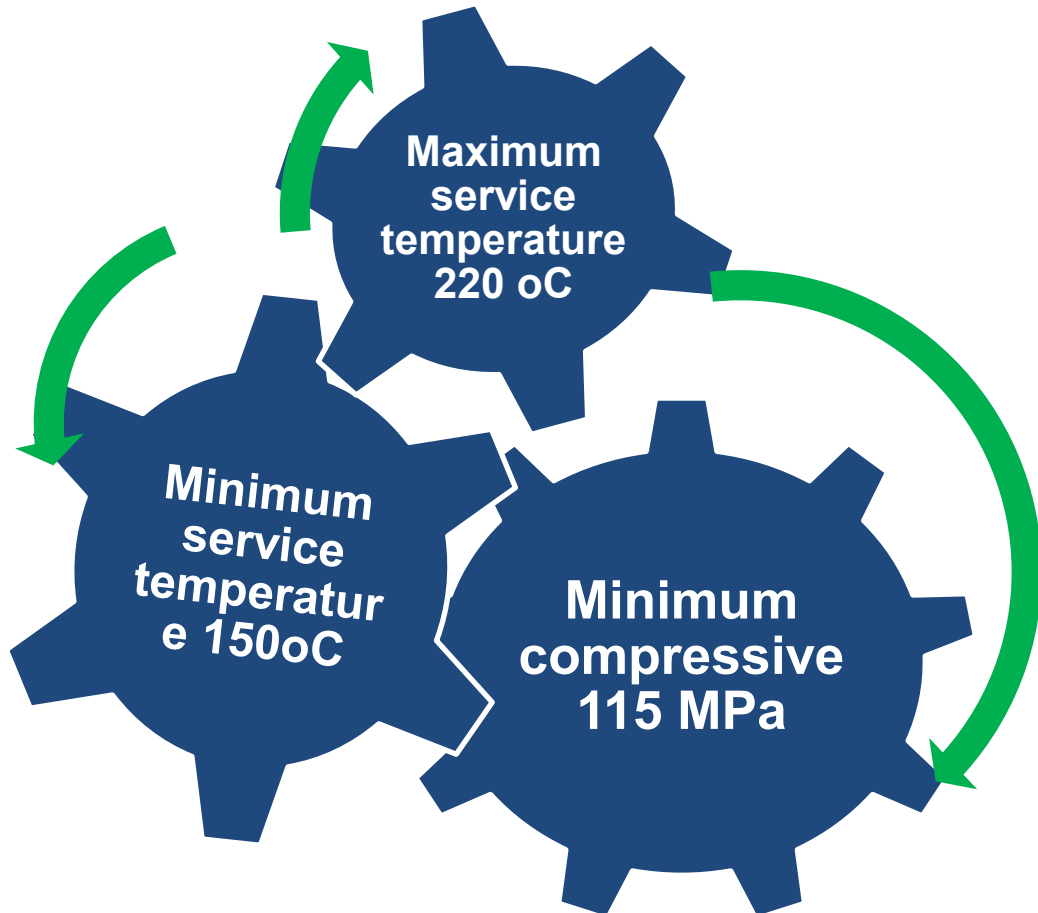
Study Methodology



Boundary Conditions for Materials Screening

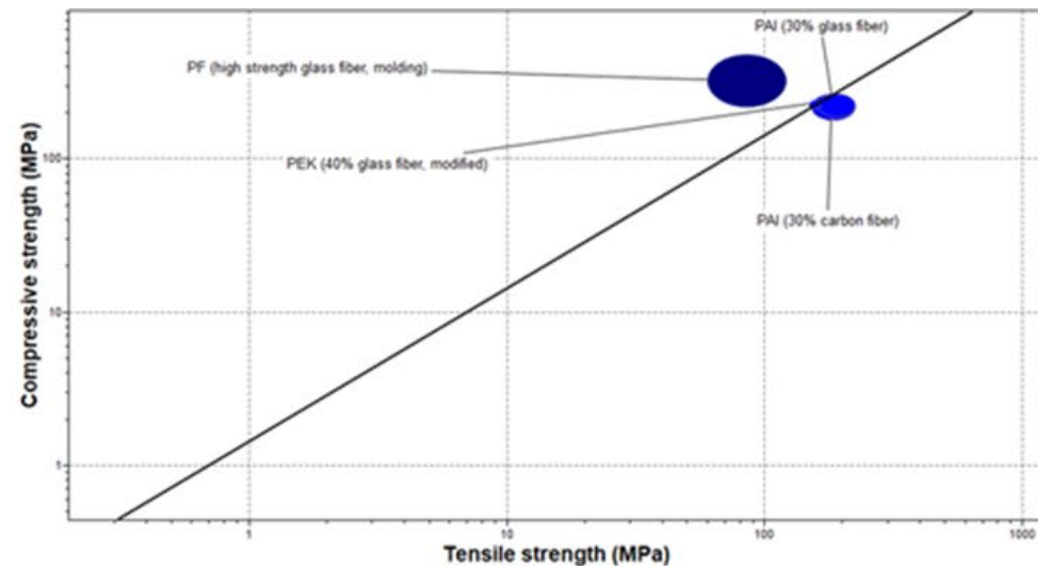
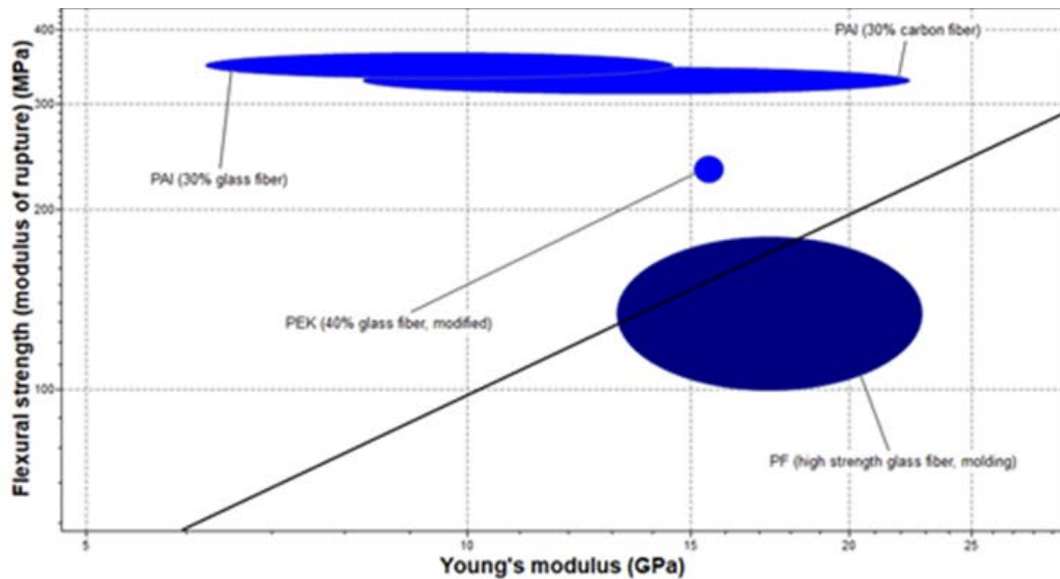
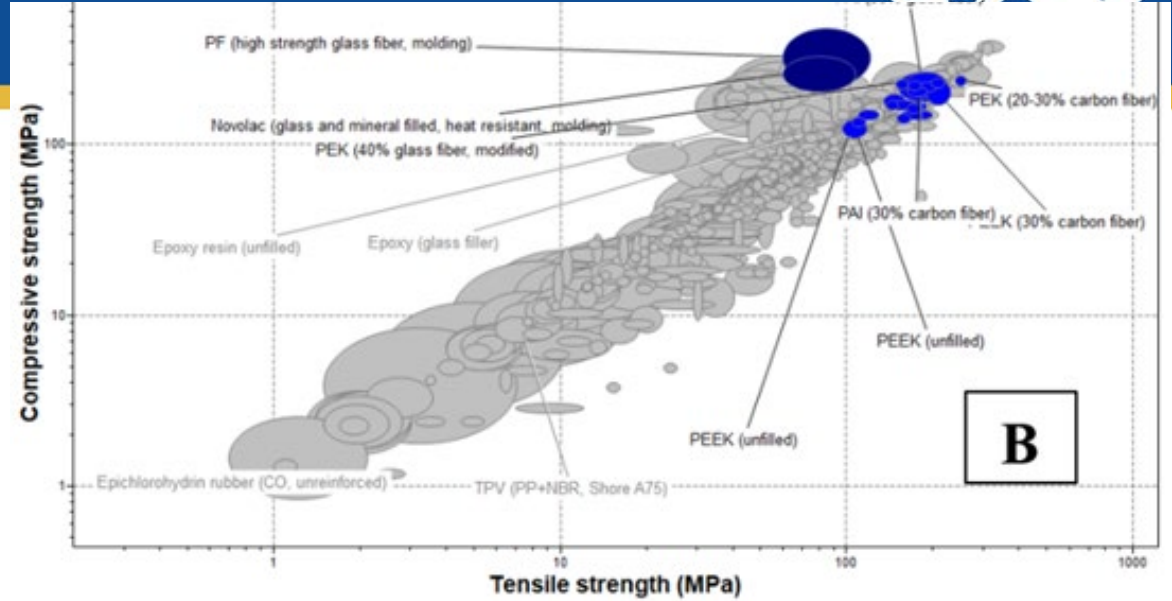
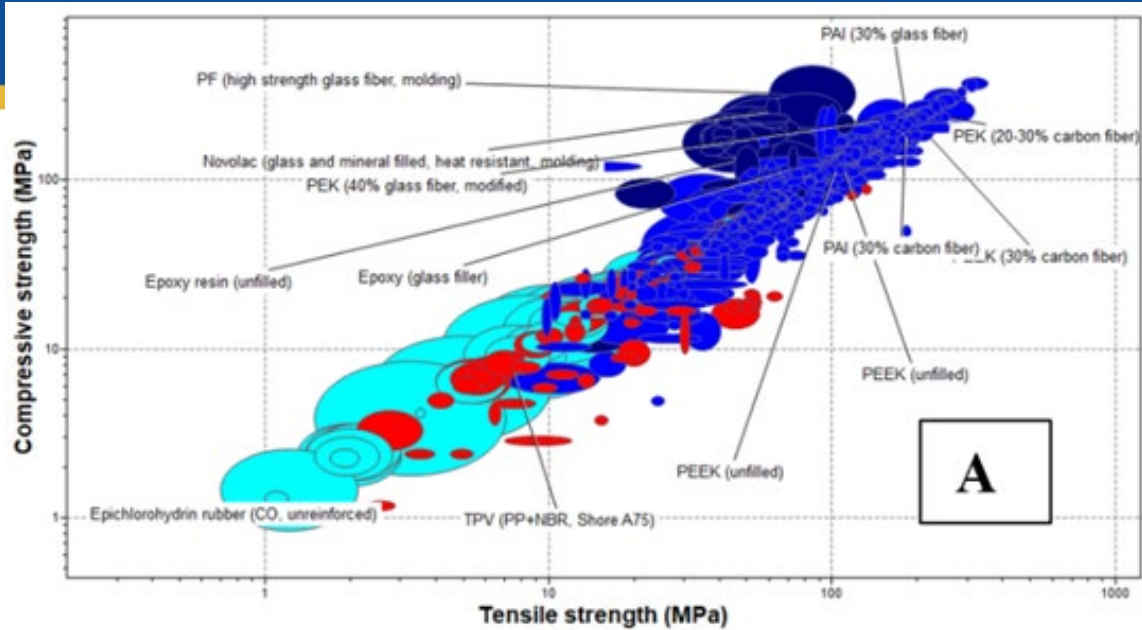


Mechanical and thermal boundary conditions



Boundary conditions for material durability in selected reservoir fluids

Level 3 aerospace polymer materials screening results



Material ranking by TOPSIS



- Decide and assign weights to individual criterion
- Calculate normalized and weighted normalized values criteria

- Determine the positive and negative ideal material solutions
- Calculate separation measures of each material from the positive and negative ideal solutions

- Calculate each material's similarity to the positive ideal solution.
- Rank the materials based on their distances from the positive ideal solution

Themaset

ResAmber

Compressive strength - 0.2

Flexural strength - 0.1

Tensile Strength - 0.1

E modulus - 0.125

Durability in brine & weak acids - 0.225

Durability in organic solvents - 0.25

TOPSIS Ranking of polymer resins for well abandonment



PAI (30% glass fibre)

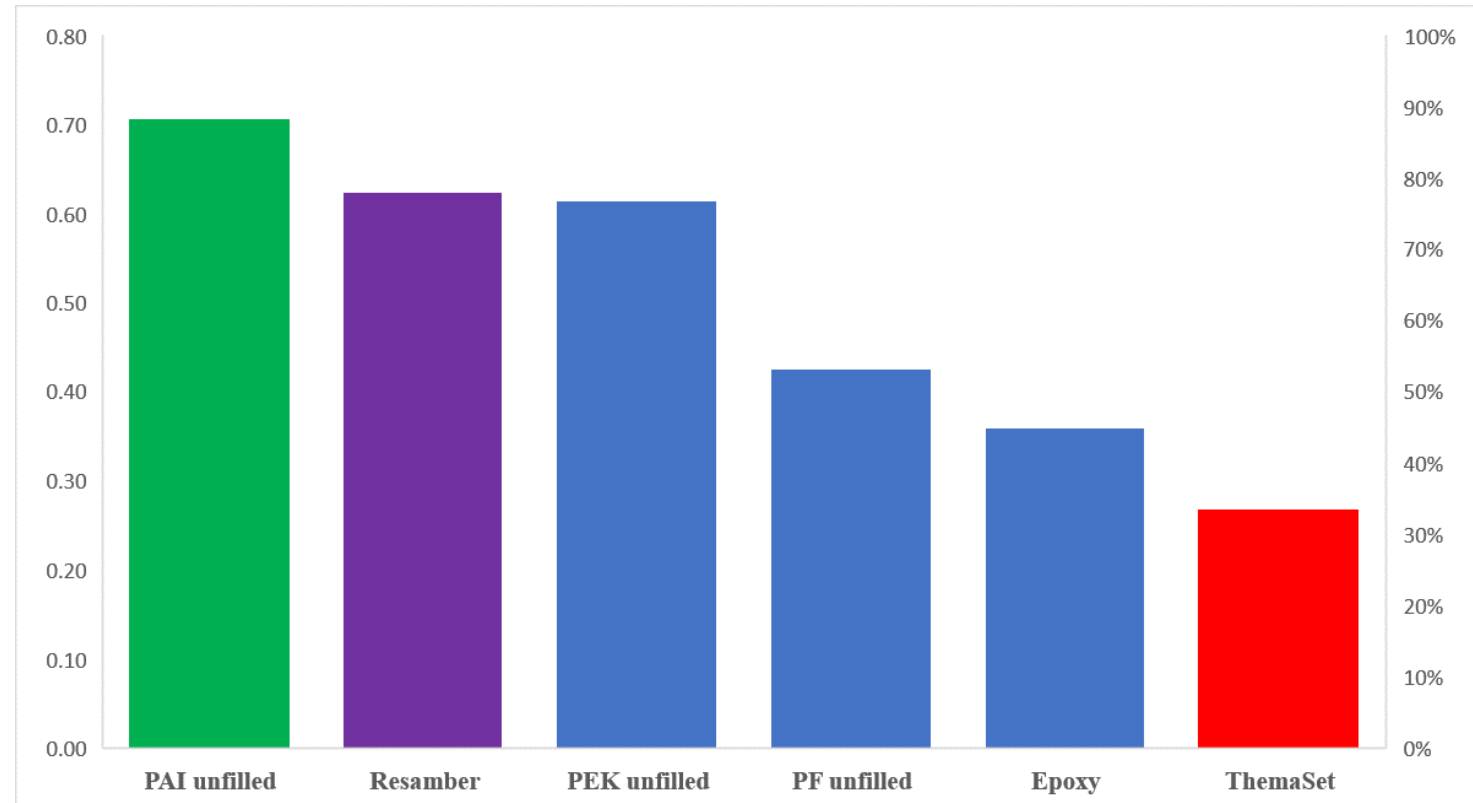
PAI (30% carbon fibre)

PF (high strength glass fibre M)

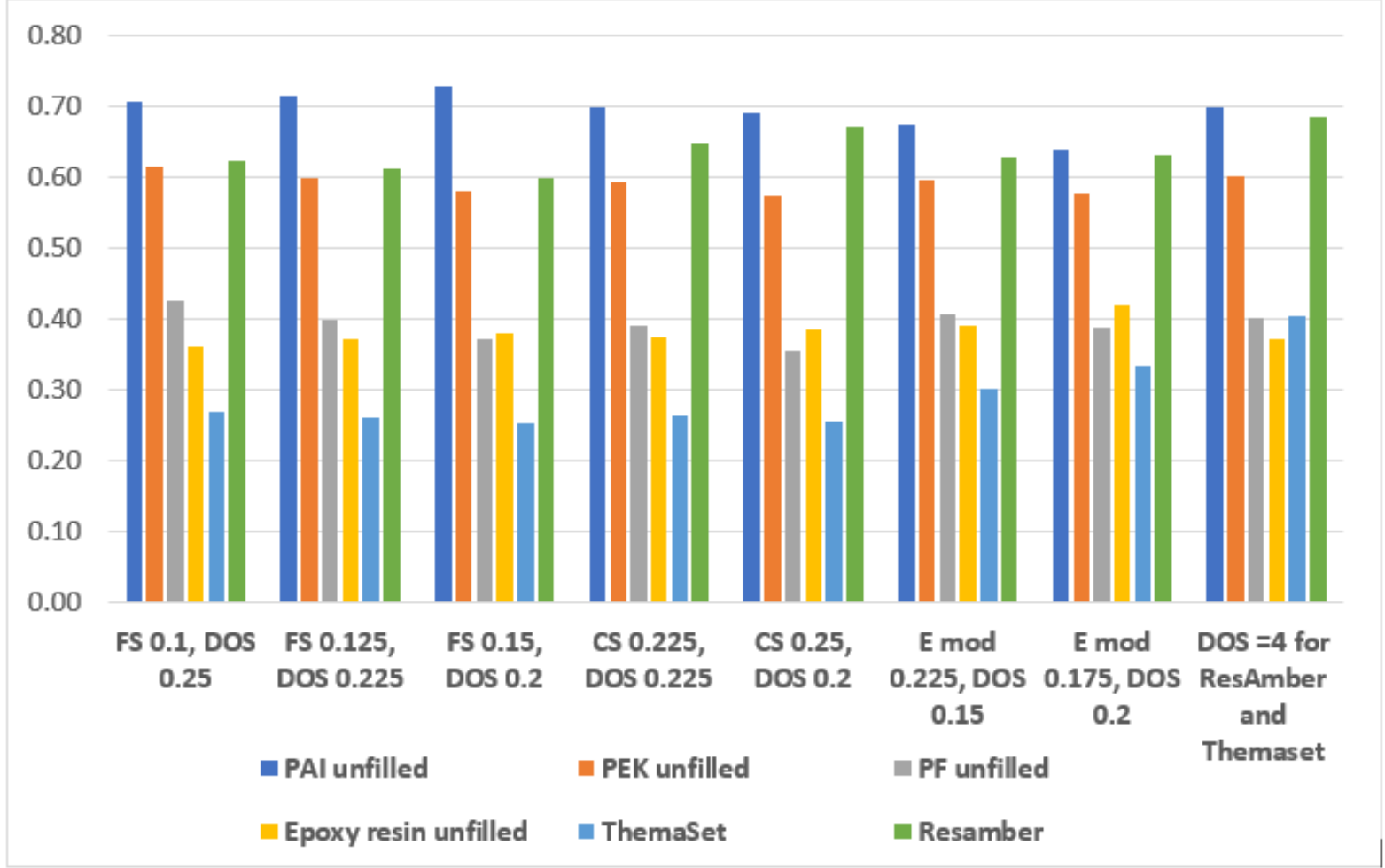
PEK (40% glass fibre, modified)

ResAmber

ThermaSet




Sensitivity Analysis of the Ranking Process.





Compressive strength (CS)	Flexural strength (FS)	Durability in organic solvents (DOS)
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Conclusion.



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- Well abandonment and decommissioning are the reality of our industry's future.

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- Polymer resins are promising alternative barrier materials to cement.
 - MCDM is a viable tool for the assessment and selection of barrier materials for P and A

- 
- P&A presents a huge challenge but also and amazing opportunity if we plan.
 - Shortlisted materials are recommended for further laboratory studies.

Acknowledgements / Thank You / Questions



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Acknowledge
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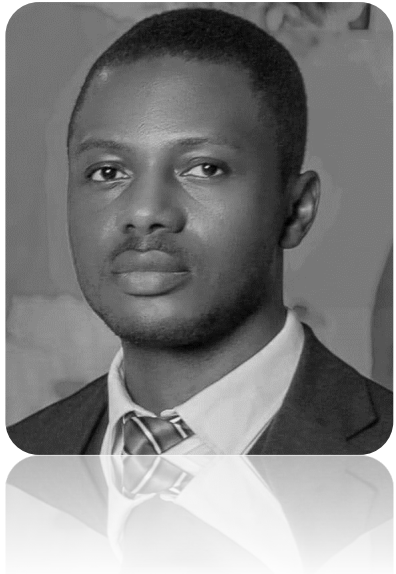


THANK YOU
FOR
LISTENING



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A well engineer with a first class degree in oil and gas engineering, a master's degree with distinction in well engineering both from Kuban State Technological University, Russia under the Federal Scholarship Board's BEA scholarship. He is currently doing his PhD in Well Plug and Abandonment at Robert Gordon University, UK, under the Petroleum Technology Development Fund OSS scholarship. He combines industry experience with research to simplify complex challenges and proffer sustainable solutions to the pain points of the oil and gas industry in every phase of the well lifecycle including wells with integrity issues from yet to be identified sources. In addition, he mentors students and young professionals from low-income countries on scholarship winning strategies and professional networking at Academy of Scholarships and Transitions.