

# P&A ..... The growth sector in Global Oil and Gas?

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# Agenda

P&A .....  
**The growth sector in  
Global Oil and Gas?**

The Importance of  
Global Alignment

Future P&A Strategy  
Broadly Prescriptive or  
Well Specific / Risk  
Based?


Improvement  
Opportunities




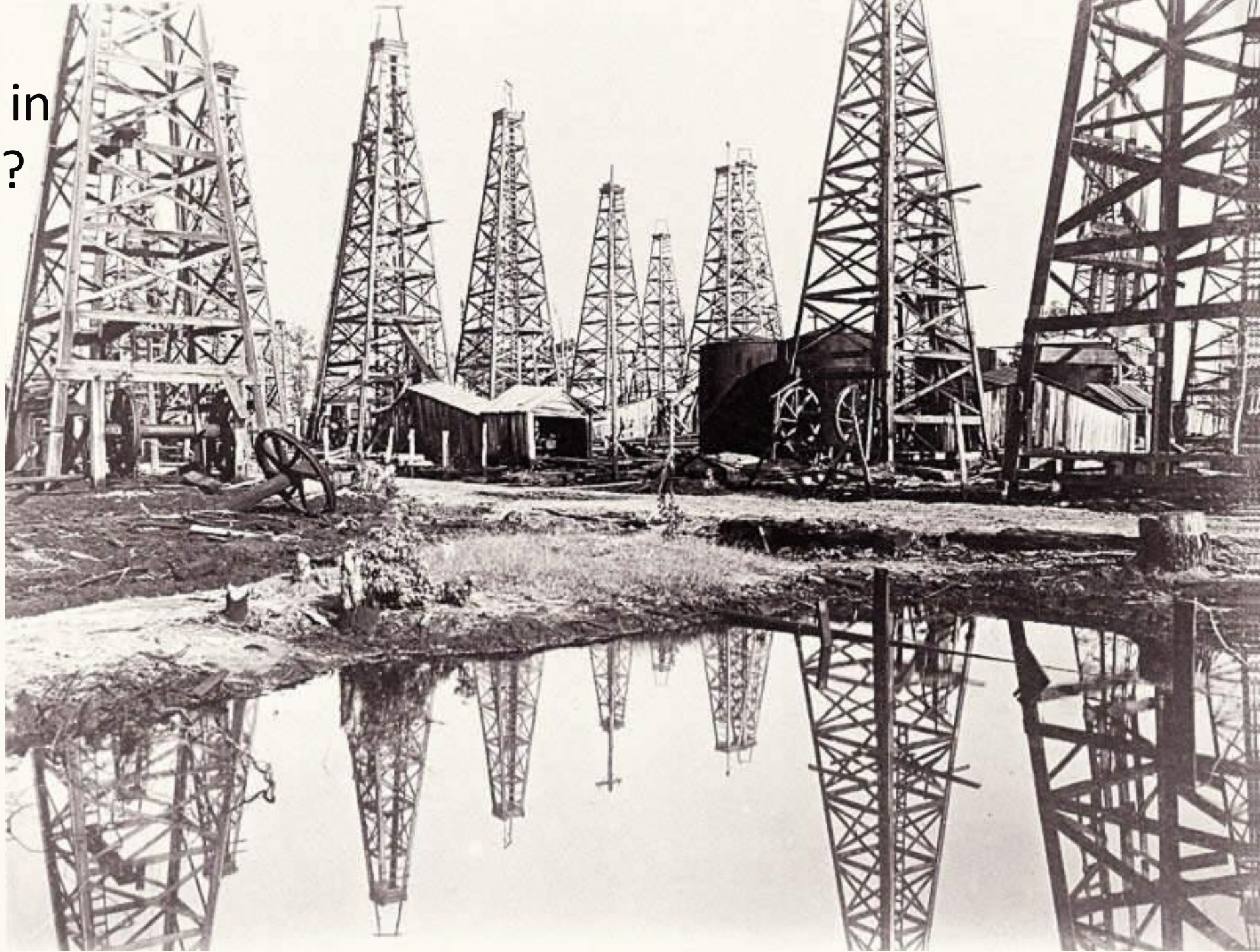
P&A .....

## The growth sector in Global Oil and Gas?

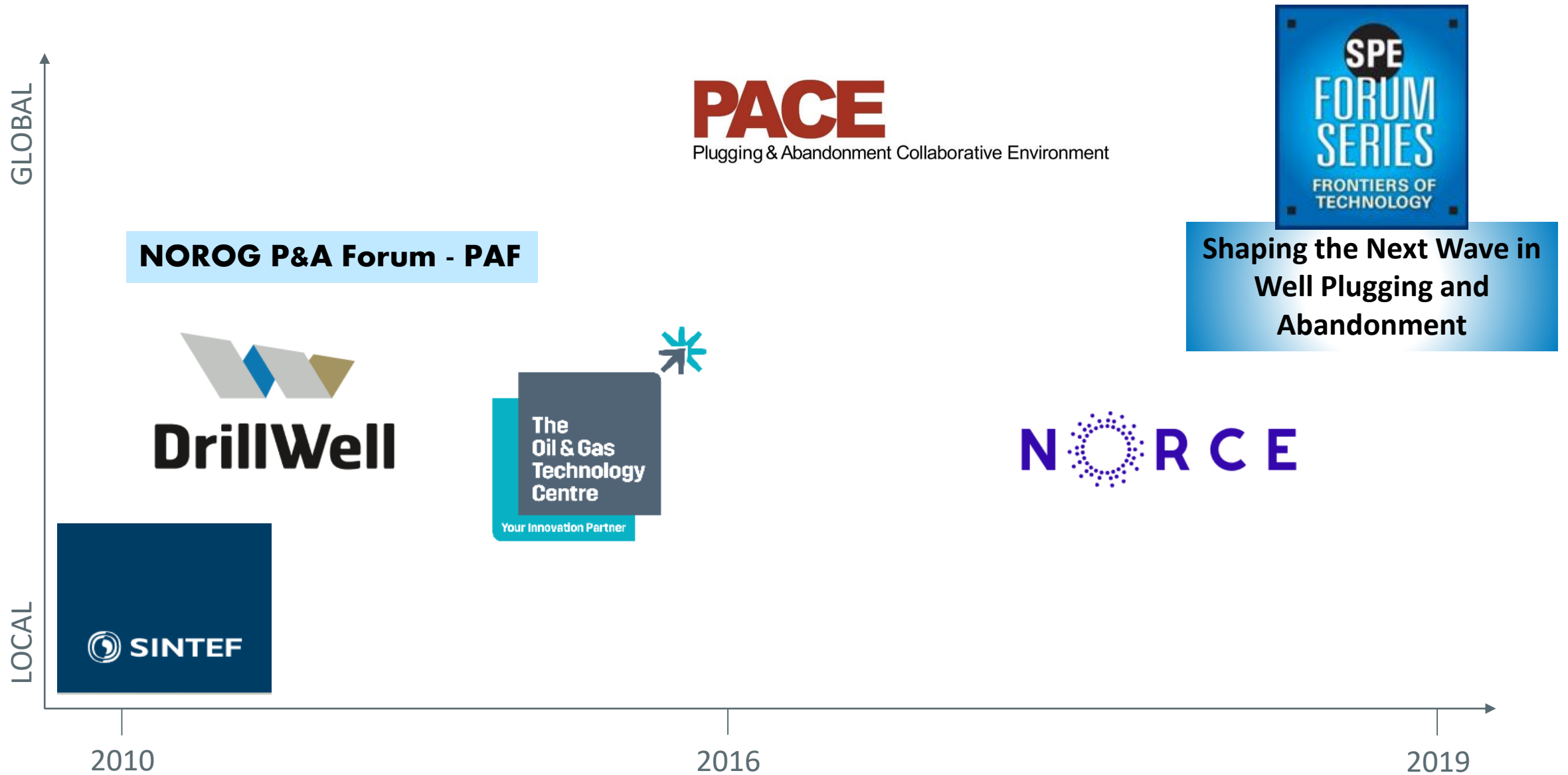
Multiple millions of wells  
around the globe is  
either still producing or  
shut in pending P&A

 2,400 wells will be  
plugged in the North Sea  
over the coming decade

 In 2014, over 1.1 million  
active oil and gas wells in  
the USA and > 1,7 million  
by the end of 2015



# Global Collaboration is Maturing



# The Importance of Global Alignment



## *“Shaping the Next Wave in Well Plugging and Abandonment”*

### Focus Areas included:

- Stakeholder Hopes / Concerns / Risks
- Uncertainties around wellbore conditions
- How to Achieve “Technical Limit”
- The Regulators Perspective
- New Technologies / Techniques / Materials
- Barrier Verification

### Priorities going forward included:

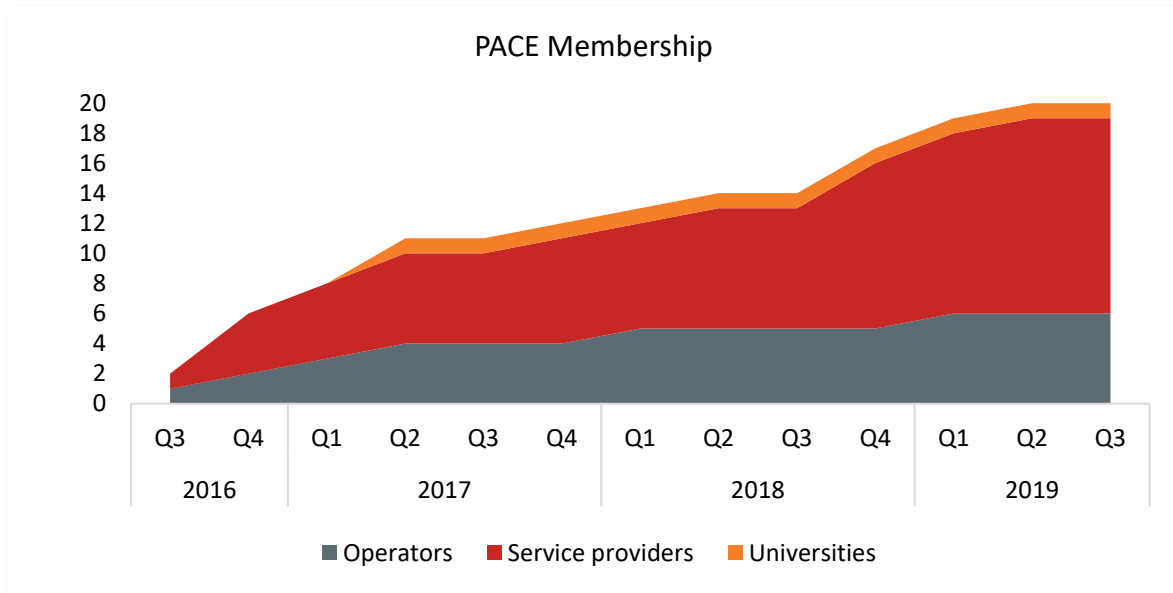
- Raise the awareness of the criticality of the P&A sector regarding environmental prudence
- Involve sub-surface expertise early in the P&A process
- The need for international standards for qualification of plugging materials
- Design new wells for effective final P&A
- Improved QA for verification of cement plugs
- More focus on data to improve Risk Assessment modelling
- A strong need for developing and maintaining P&A professionals



# Current PACE members (aiming for 10 more by Q4 2020)

## PACE

Plugging & Abandonment Collaborative Environment



# Future P&A Strategy – Prescriptive or Risk Based?

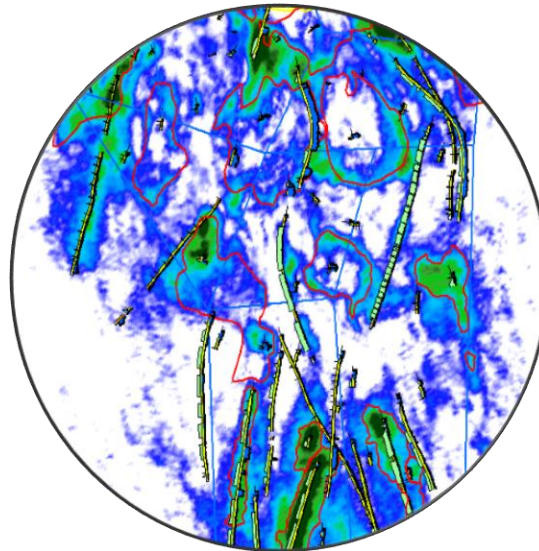
## Current P&A Drivers

Prescriptive standards designed to cover all wells, including necessary safety factors for a very broad spectrum of well types.



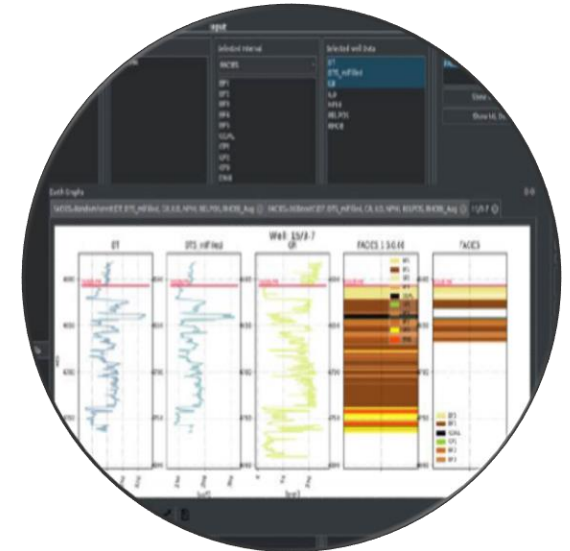
## The Game Changer?

Experience and knowledge gained over the last decade offers an alternative approach to P&A design and execution



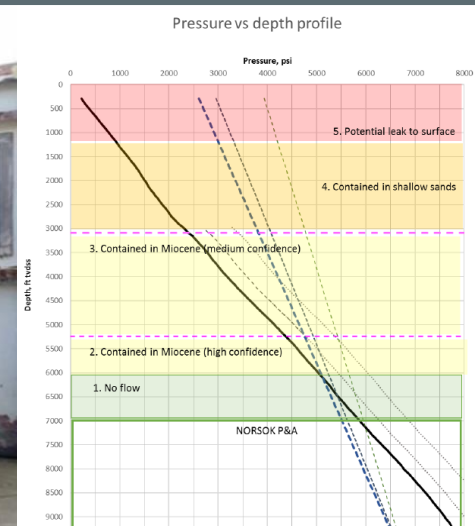
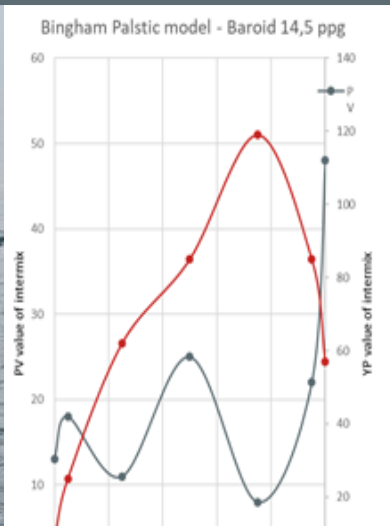
## Future Risk Based P&A

Establish and manage P&A Strategy Well specific P&A Design - multi functional risk assessment to determine plugging strategy





# Future P&A Improvement Opportunities - Rig based P&A Solutions



## Operational Efficiency

- Casing milling / Section milling
- Surface plug efficiency
- Dual String Plug setting
- Lessons Learned / Resource Continuity

## Barrier Quality

- Improved plug setting techniques
- Fluid management for cement operations
- Alternative plugging materials
- Activated formation as a barrier

## Barrier Verification

- Dual String Bond Logging
- Activated formation barrier verification

## Risk Management

- Improved Data management
- Cross functional Risk Management

# Future P&A Improvement Opportunities - Rigless P&A Solutions



## Remove Steel

- High Energetics
- Abrasive Milling



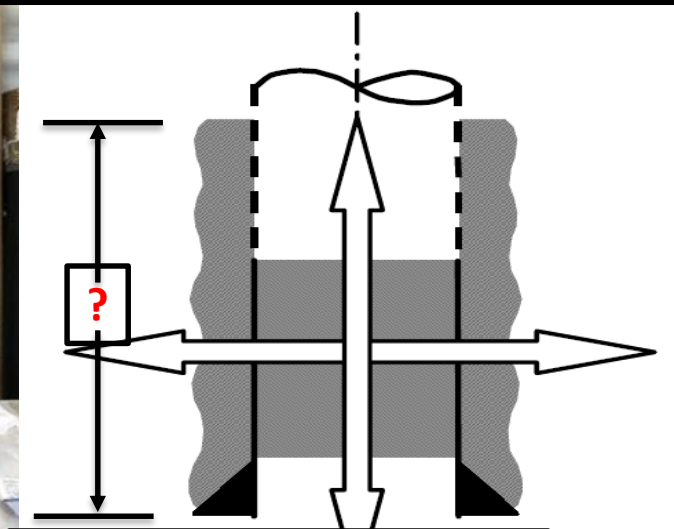
## Place the Plug / Barrier

- Alternative plugging materials
- Activated formation as a barrier
- Dual String Plug setting
- Fluid management for rigless cement operations



## Barrier Verification

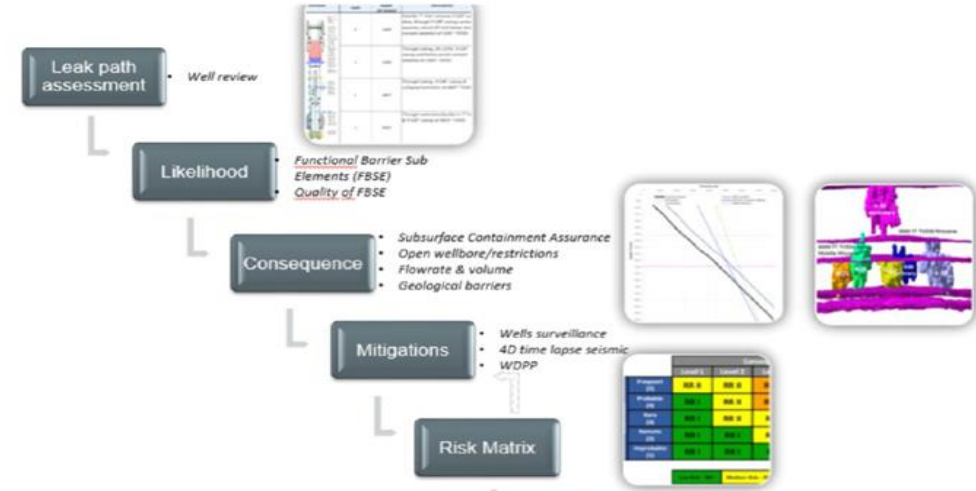
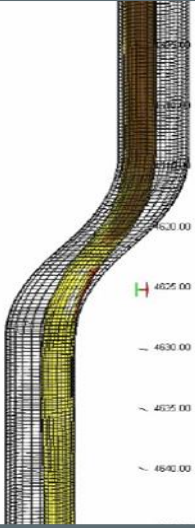
- Dual String Bond Logging
- Activated formation barrier verification



## Risk Management

- Improved Data management
- Cross functional Risk Management

# Future P&A Improvement Opportunities - Hybrid P&A Solutions



## Increased Rigless P&A Scope

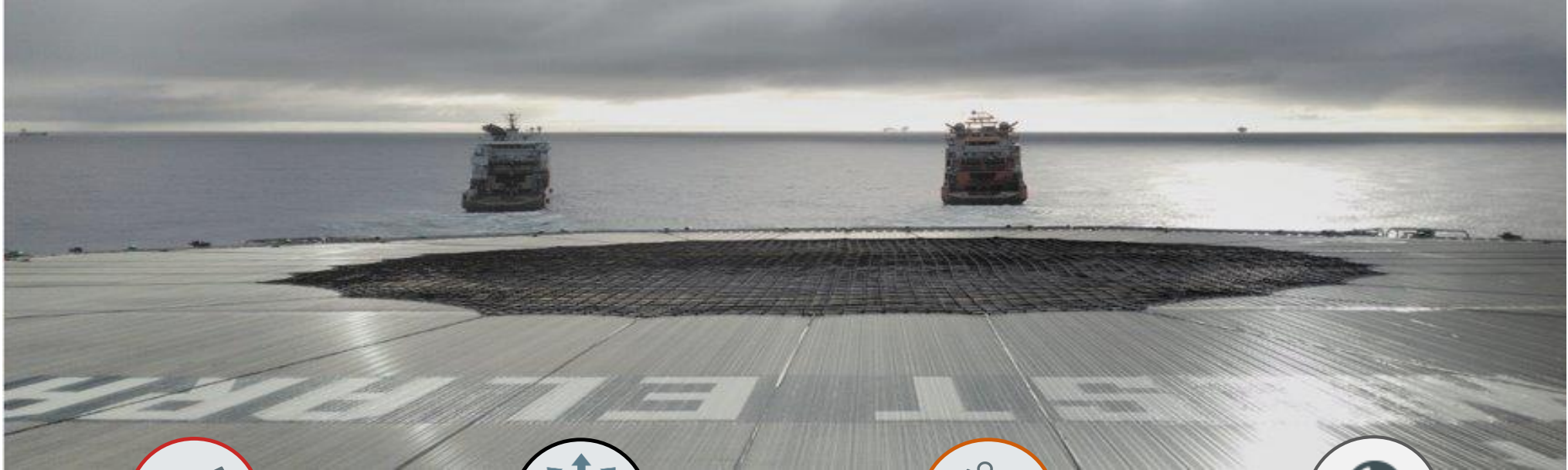
- Early tubing removal
- Deep functional barrier setting / strengthening / verification
- Formation activation processes
- Establishment of deep cross-sectional barriers where possible
- Rigless Conductor Removal

## Remaining Scope with Rig

- Establishment of cross-sectional barriers
- Surface plugging
- Conductor removal

## Risk Management

- Improved Data management
- Cross functional Risk Management



Clearly, a massive scope of work to be delivered over multiple decades



Global engagement is ramping up rapidly ... clear need for alignment



Need for common industry approach to risk based P&A design



Numerous Improvement Opportunities to drive improved quality and efficiency in P&A operations

P&A ..... Is **THE** growth sector in Global Oil and Gas