



Helix
ENERGY SOLUTIONS

Subsea well abandonment methodology

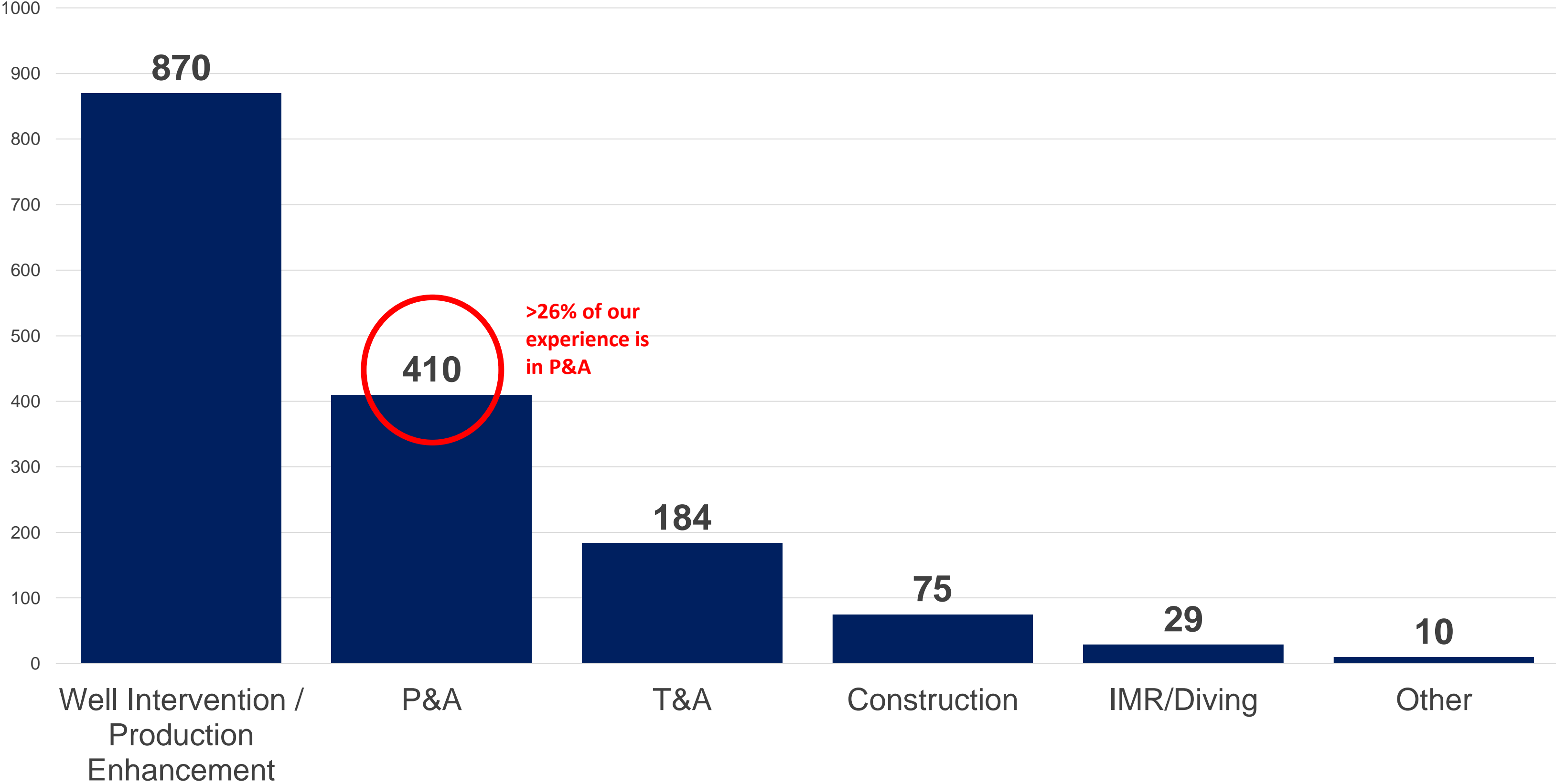
...bringing it all together

Neil Greig



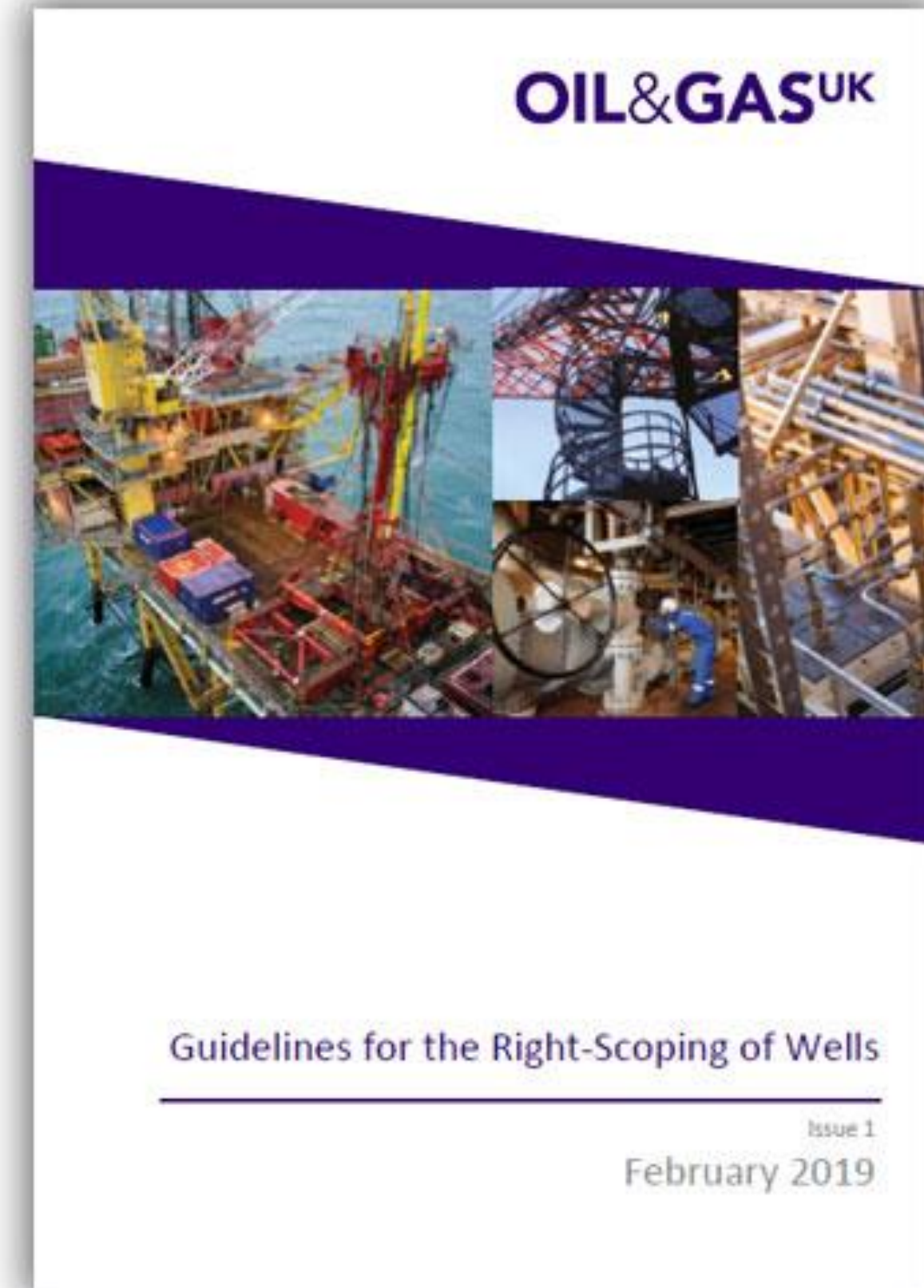
GLOBAL WELLS EXPERIENCE

of Well Interventions by Type



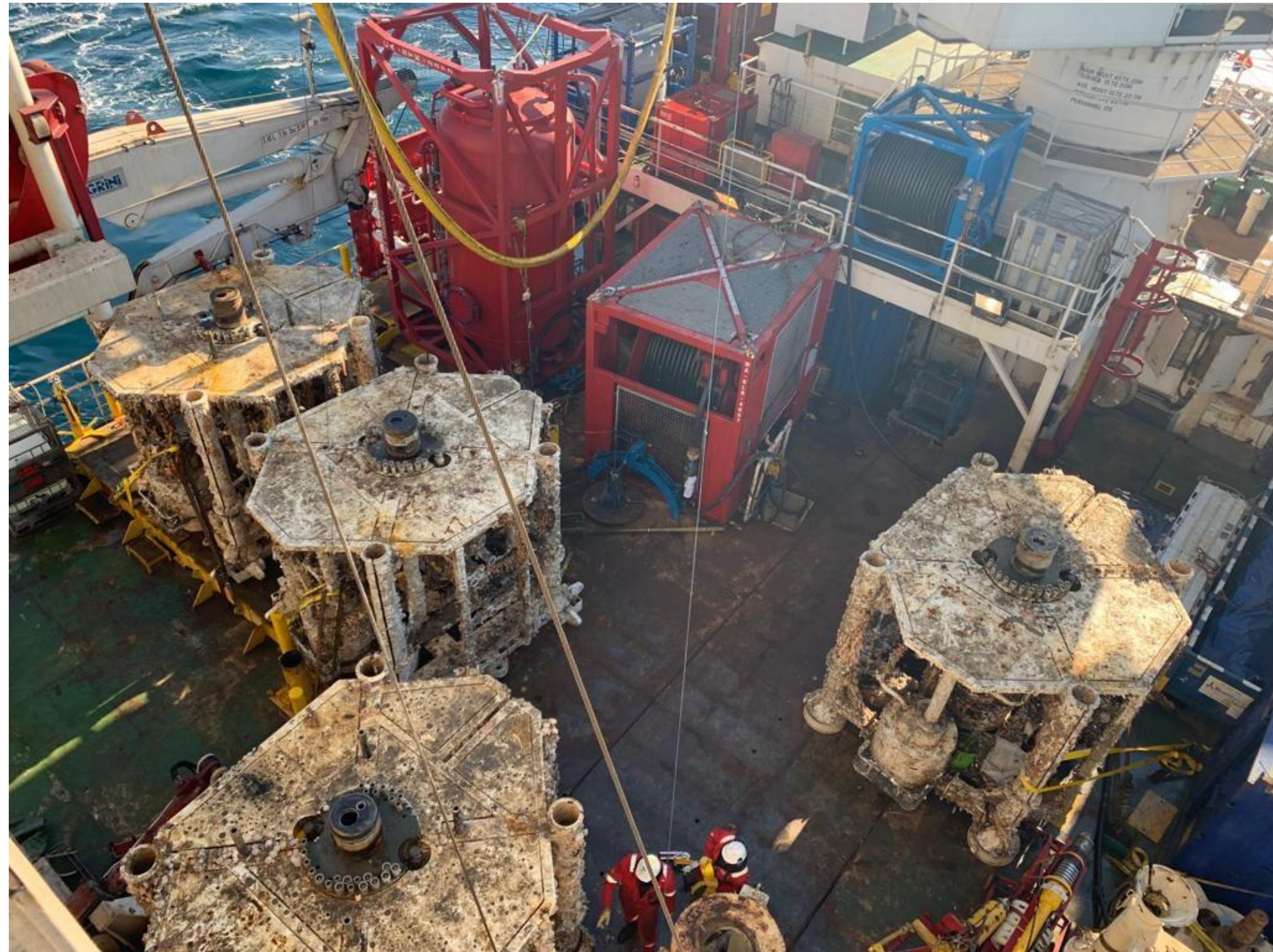
RIGHT SCOPING

- **OGUK issued guidelines for the ‘Right-Scoping of Wells in 2019.**
- **The purpose of the guidelines is to help operators develop the minimum required scope for their well designs**
- **It’s aimed primarily at increasing drilling activity in relation to MER.**
- **The same approach can be applied to P&A to help achieve the OGA’s other objective using the appropriate asset to achieve the outcome**



SUBSEA WELL DECOMMISSIONING

- **The technical challenges surrounding P&A only increase as assets deteriorate**
- **In order to meet the OGA and industry objectives to reduce cost there must be Right Scoping**
 - Understand the problem
 - A flexible approach
 - Reduce contingencies
- **Much earlier engagement before an ITT is issued**
- **More dialogue with the Supply Chain helps deliver lower cost**



NO TWO WELLS ARE THE SAME

Wells by nature will have a variety of challenges

- some are already known
- others unknown waiting to be discovered...

**Need to look at how to find the best 'technical solution'
not the sledgehammer**

**INFORMATION IS KEY TO PLANNING
PLANNING IS THE KEY TO COST CERTAINTY**



CHANGE IN TECHNICAL APPROACH

- **OGUK (OEUK) guidelines 2015 & 2019**
- **Well construction using a rig shouldn't equal rig P&A**
- **Reservoir pressures are a factor +ve / -ve**
- **As is the wellhead and tree conditions**
- **Risk assessed**
- **Siloed behaviours need reviewed**
- **Can LWI do more if the well is restricted?**



SUBSEA WELL CHALLENGES

- Trees with no barriers
- Tree caps that are inoperative
- No controls or leaking controls
- Weak tree systems
- Unknown well conditions
- Disconnected from host
- Trees will need recovered
- Cement quality is often unknown
- Intermediate plugs are required
- Environmental plugs & severance

HOW THEY CAN BE OVERCOME

Hot tap and gas cap flare-off with specific equipment (2012)

Tree cap mechanical strip down with divers on the subsea tree (2013)

DSV Install ROV controls or direct controls or pump in sealants

Light weight SIL's (23Te/40Te/75Te) v >250Te BOP

Data gathering (can also be performed during production to plan ultra late life & P&A)

Divers obtained barriers offline whilst performing LWI – multiple campaigns

Do in advance to save rental of DBR etc -129 trees recovered to date

Remove tubing to log.....or use new technology to perform CBL through 2 casings

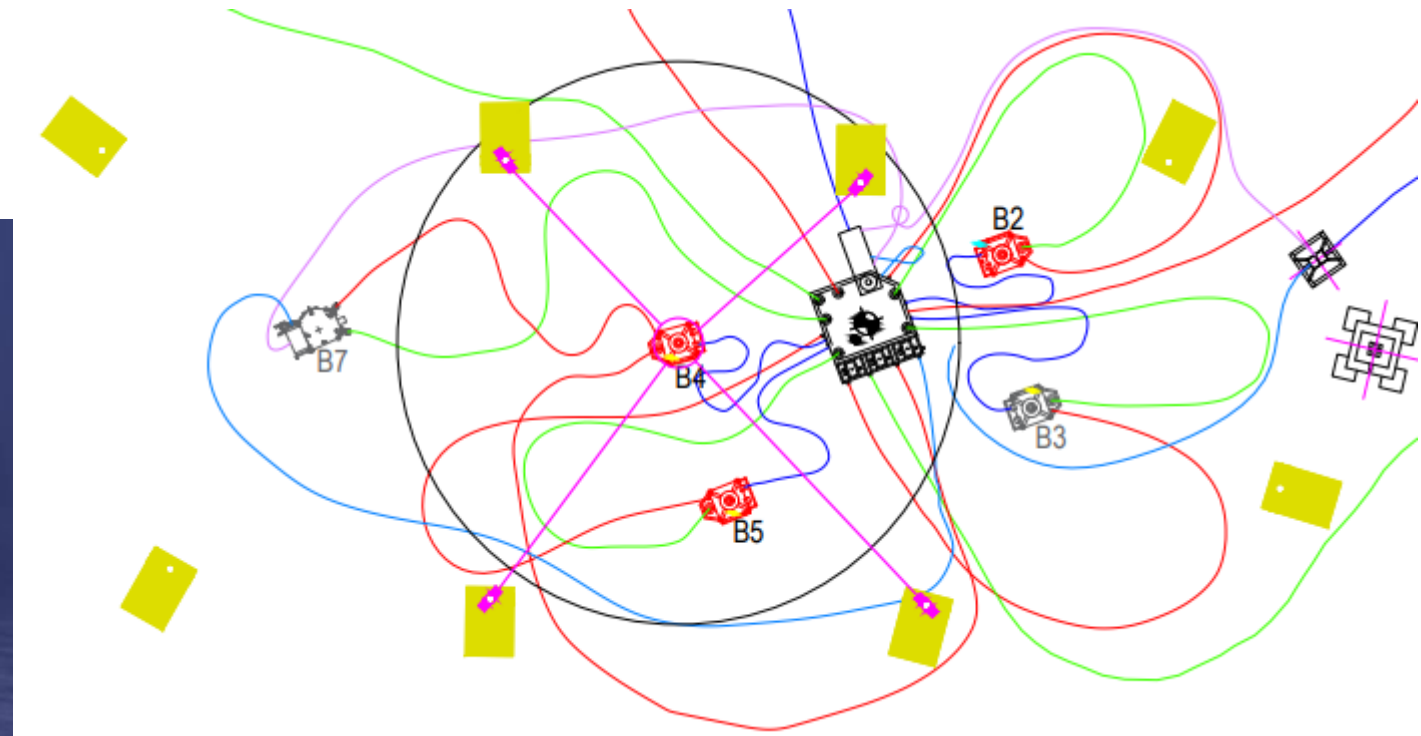
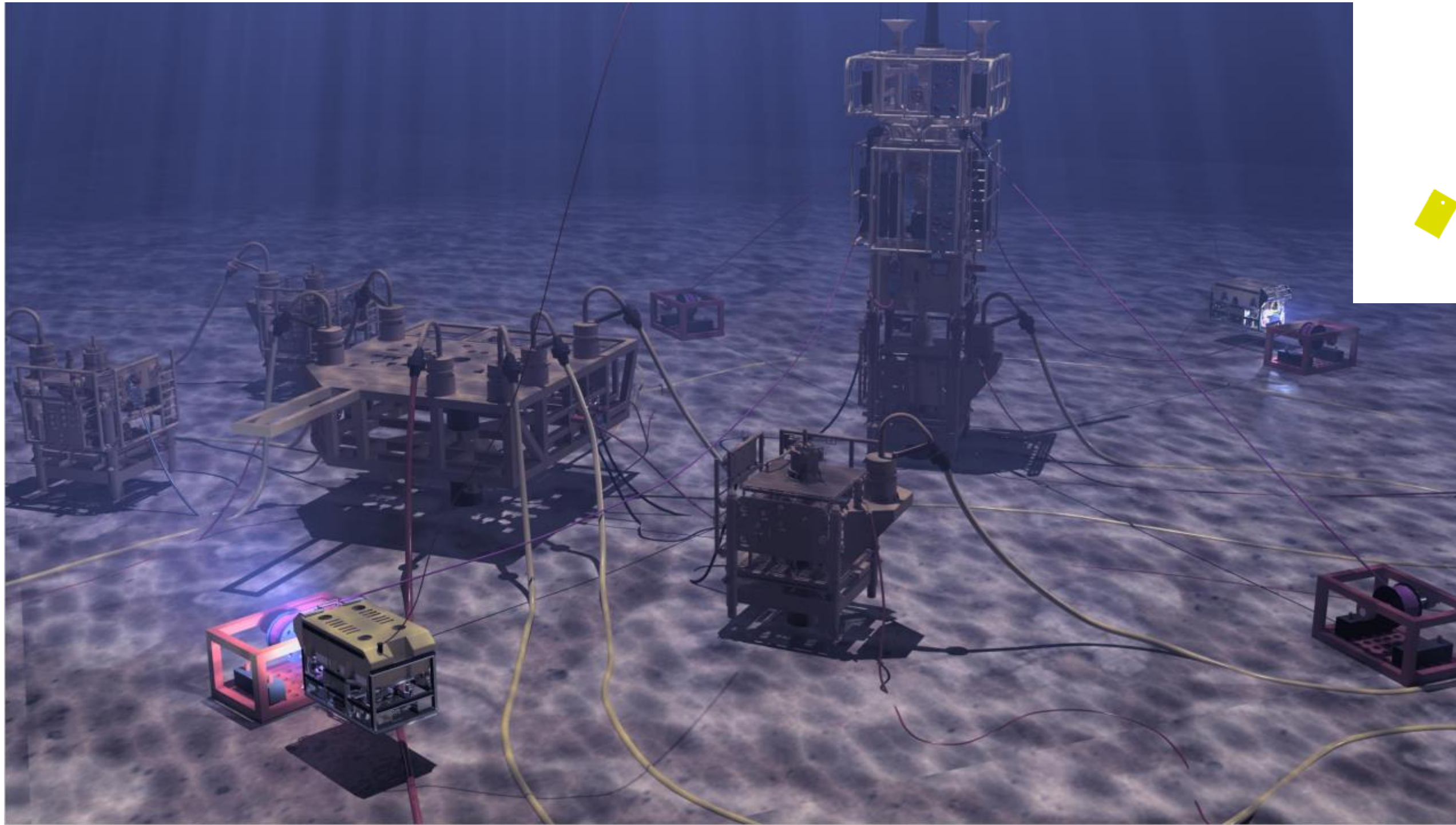
New technologies can support cement in annulus – conducted in 2019 rigless

Straddle packer cement tooling and severance phased approach – 155 E&A wells P&A'd



TETHERING

Tethering is needed where a wellhead or tree is simply too fatigued or too weak to take any unsupported loading.



WHAT CAN BE ACHIEVED BY PHASE – PHASE I

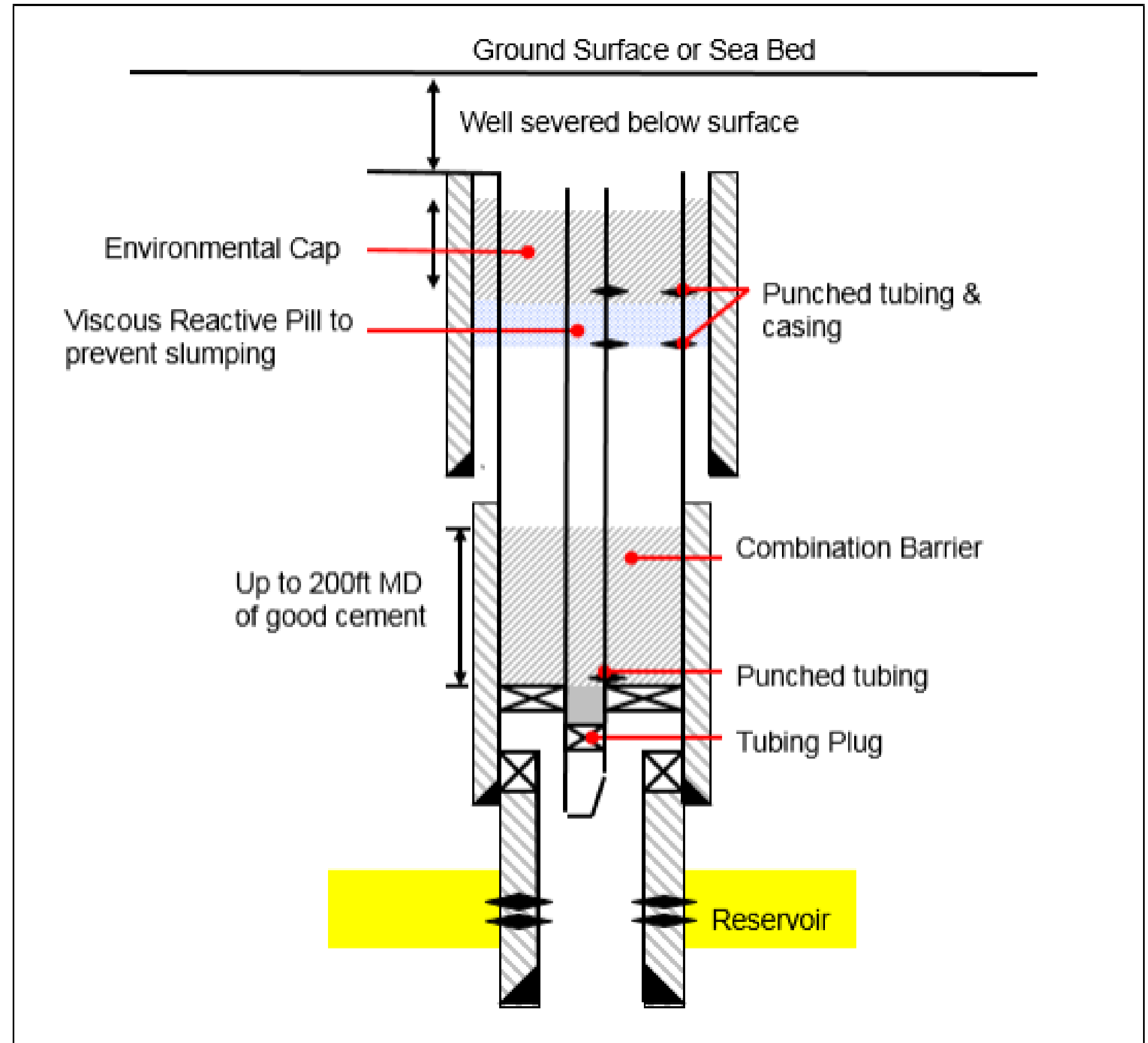
Well Suspension – making the well safe for Phase II e.g. setting plugs to allow BOP connection

and/or

Data Gathering

In some cases AB1 plug setting ‘through-tubing’ and AB2 is now also possible ‘through-tubing’

BUT....what if you can’t get to HUD for example Scale at SSSV or parted tubing below the SSSV.....



PHASE II

With the XT removed, no EDP/LRP or Dual Bore Riser requirements

AB1 reservoir abandonment using a 'heavier' asset such as a HWI or a Semi/MODU/JU

Or use riser based vessel to perform CT operations to

- Deal with scale
- Pull the tubing
- Set cement (AB1)
- Section mill or PFC (AB2)



PHASE III

**Environmental plug setting, wellhead severance
from an LWIV or CSV**



RIG ONLY or PHASED APPROACH

You can of course tackle subsea wells with a rig only approach, particularly one that can provide many of the same services as an LWIV, but what can't be compensated for is mobility around the field and general transit/mobilisation efficiencies

Without right scoping you run the risk of either over spec'ing the asset and contingencies, or under spec'ing which both come with cost implications

There are some fields that will require multiple rig moves, some in excess of 20, each with AHTV's, slow transits (4.5kts) ballasting etc.

LWIV transits at >11kts, HWIV up to 17kts

DP quick set up an efficiencies learned by design and practice



NEW TECHNOLOGIES

- ROAM – enables ‘open-water’ tubing recovery
- PWC on coiled tubing
- Section milling on coiled tubing
- High viscosity cement retainers
- Multi-string logging tools
- Multi-string punching tools
- Scale remediation tools not excluding CT
- CT Drilling
- Other ‘novel’ technologies

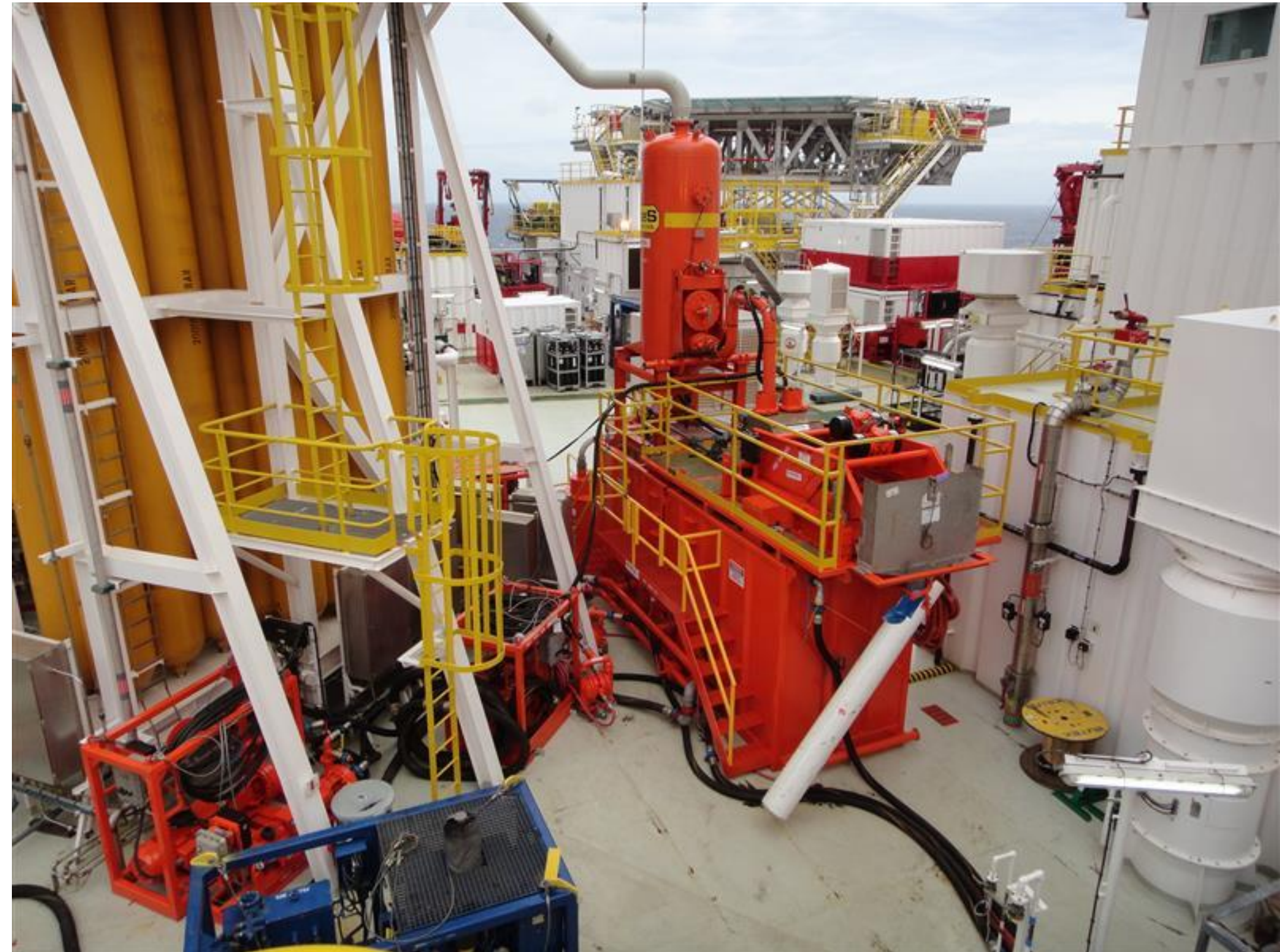
*6.000" O.D. Carbide Mill:
Before underreamer mill:*



After underreamer run – expected wear



*8.300" O.D. Underreamer:
Before underreamer run*



THIRD PARTIES AND ALLIANCE(S)

Archer



HALLIBURTON



Subsea
Services
Alliance

oilenco



Welltec



claxton



WELLVENE

CETCO



3M



HOW DO YOU CONTRACT IT?

- Day rate models have a place, but they don't drive innovation or performance
- Lump Sum contracting isn't always the most cost effective approach as it prices in all conceivable risk
- Performance contracting works best where all the parties share the risk and the incentive is to improve performance. It can also be tailored to each discrete phase rather than one that covers an entire project
- Only take what you need to minimise contingency costs, it's easy to over spec and over load the asset with equipment
- Aggregate phases with upfront data gathering so you can categorise and batch the wells and then come back in another phase appropriately equipped

VESSELS, ASSETS, PEOPLE.

Thank you

