Emulating Nature Whilst Reducing Well Costs Can’t be a Bad Thing.
• We can all agree that new technology is necessary and exciting

• However, mature technology still has a lot to offer

• In this climate more than ever, we need to be sure to use “The Right Technology”
• **Multilateral technology is not new.**

• **However with the recent down turn in the industry and the loss of many engineers, for some companies multilateral technology can be new, or at least new to them.**
Multilaterals Are Not New

Robert E. Lee - 1931

Reynolds, et al - 1938
In 1953 a petroleum engineer called Alexander Grigoryan from Azerbaijan, constructed one of the world’s first documented multilateral wells with 9 laterals.

These 9 laterals increased exposure to the reservoir by 5.5 times and increased production by 17 times.
Multilateral Designs

- Planar Trilateral
- Stacked Trilateral
- Planar Opposed Dual Lateral
Multilateral Designs

- Injector
- Producer
- Attic oil
- Oil/water contact (OWC)
- Water drive
What IF We Could........

- Reduce the amount of slots used, resulting in smaller platforms and sub sea templates whilst drilling fewer top hole sections
- Reduce the number of Xmas trees and flow lines required
- Deploy fewer casings and therefore less casings, liners and cement required
- Reduce the volume of cuttings to handle, transport, treat
- Have less wells to abandon later in life
This article published back in 2012 on the Vincent project for Woodside Western Australia, details a full field developed using only 13 wells, 13 upper completions and 13 subsea trees, in conjunction with 31 laterals resulting in a cost saving of $1b.

They also state that in their experience it takes 30% more drilling and completion capital expenditure to add a lateral.

- They reviewed a data set over 22 years of constructing multilateral wells globally.
- The data set included 951 multilateral junctions within 778 wells covering all TAML levels, onshore and offshore.
The two statements below are referenced from: A Multilateral Technology Strategy Document (Gorm Liland et al, Halliburton AS, Aug 2015).

- As of June 2015 more than 240 junctions in 165+ wells are installed on the Norwegian continental shelf.
- The paper states that adding one lateral section to a mother bore costs 27% more, and the additional reservoir exposed can be more than doubled.
• I firmly believe that not every multilateral well needs to be Einstein smart.

I would say they just need to be Smart Enough.
• Increased Reserves
  ▪ Access reserves whilst reducing well development costs
    ▪ Marginal reservoirs
    ▪ Stacked/ compartmentalized reservoirs

£40 MM
+30% = £52 MM
• Where Can Multilaterals be used?
  ▪ Small pools
  ▪ Tight rock
  ▪ Stacked/ compartmentalized reservoirs
  ▪ Pools that are impossible to connect with one hole section
  ▪ **MRC (Maximum Reservoir Contact) and ERC (Extreme Reservoir Contact)**

Multilateral Driver Overview

- Use less slots
- Increase reservoir contact per well
- Exploit & access small pools
- Generate less cuttings and reduce costs for disposal
- Reduce costs for casing and cementing
- Reduce costs using fewer well heads and Sub Sea trees
- Use as an injector post economical production
- Use existing wells and add laterals

Construct a Multilateral Well
Currently I'm working with a German client who is planning an ERD ML well with the junction @+/- 5100m MD planned to spud in Q1 2018.

Current world record for ML junction placement: SPE 145675

6950m MD
• Multilateral technology is not only applicable to new wells

• A junction can be added to an existing well to a completely new target while suspending the original bore

• I would suggest that any new well should be constructed in such a way to allow the addition of a lateral, not just a sidetrack or abandonment.
• There are several analogue wells in the Southern North sea that have been given a second lease of life by adding one or more laterals.

• There are even wells that the motherbore was suspended for several years and the lateral constructed and produced on its own before bringing back on the motherbore.
Might it be possible to imagine that one operator constructs and owns one leg of a multilateral well

Whilst the other leg is ERD drilled into another lease whilst funded and owned by another operator or financier

Yet drilled, constructed and produced to the same facility.

This may be one version of the collaboration now necessary in our industry.
Multilateral Solutions