

# 26<sup>th</sup> World Gas Conference

1 – 5 June 2015, Paris, France



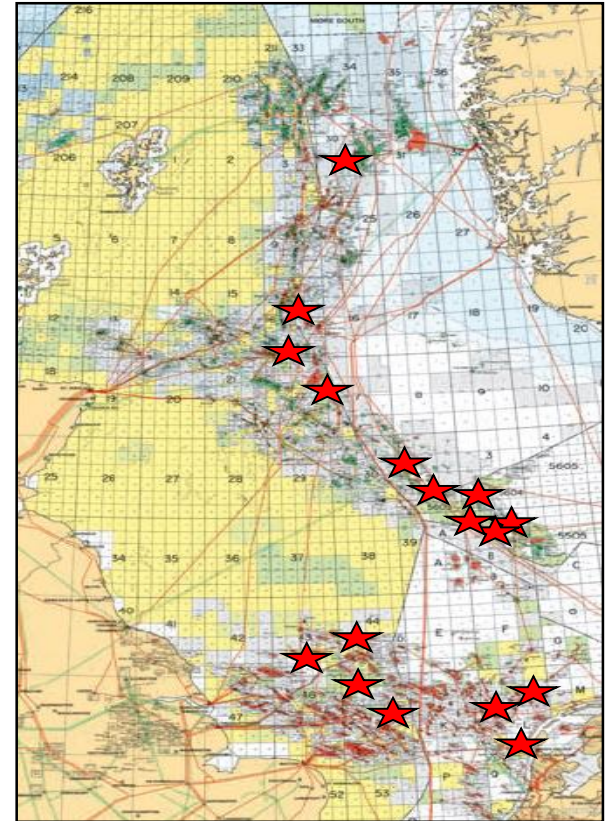
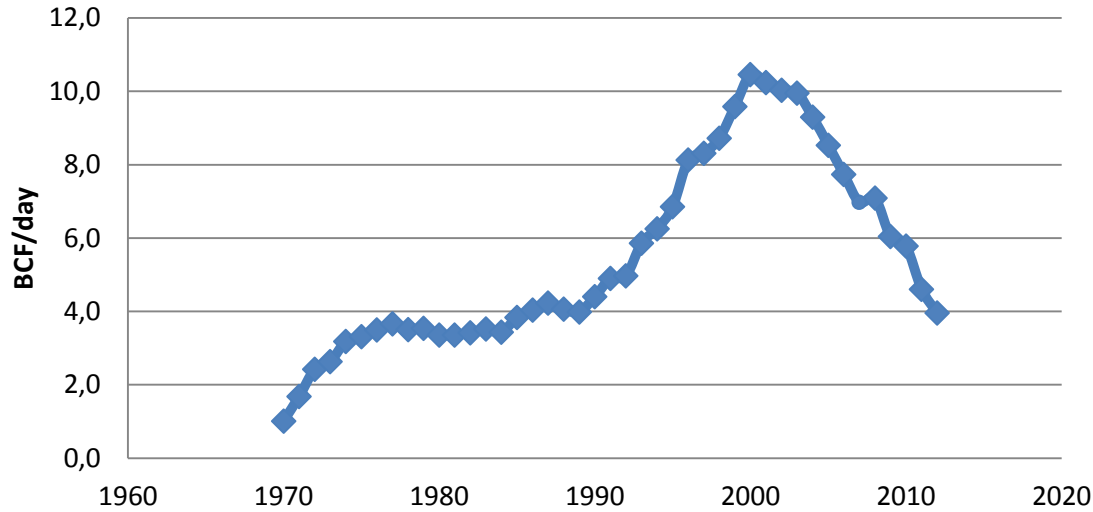
## THE EVOLUTION OF COMPLETION PRACTICES AND RESERVOIR STIMULATION TECHNIQUES IN THE GAS FIELDS OF THE SOUTHERN NORTH SEA

Bogdan Bocaneala  
Schlumberger



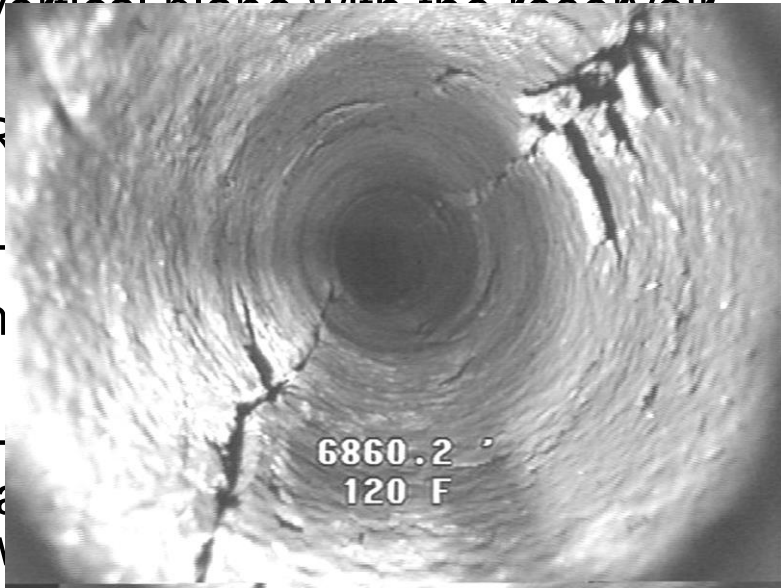
# Well Stimulation in the North Sea

UKCS North Sea Gas Production



# Well Stimulation in the North Sea – Sandstones

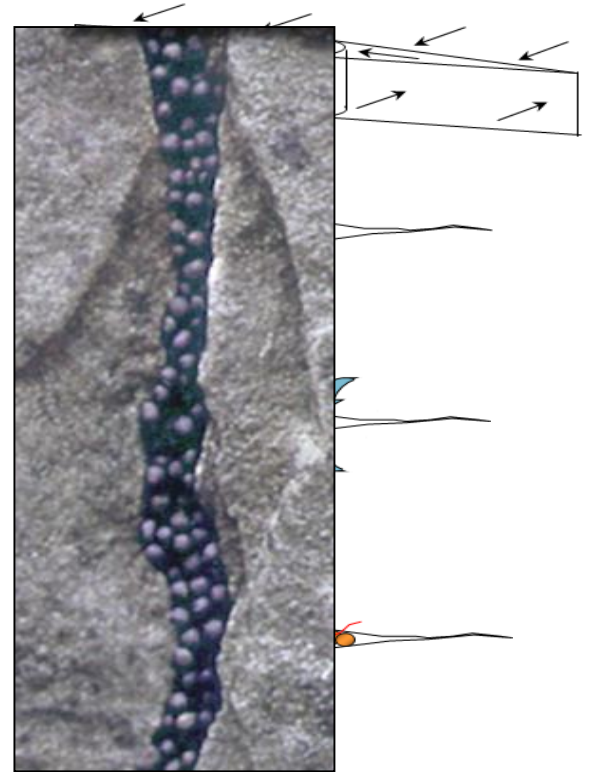
- Objective: To create a high conductivity vertical plane with the reservoir



- Fracture is created using a

- Tool joint using a

- Hydraulic fracture, to the



# The Early Days Challenges

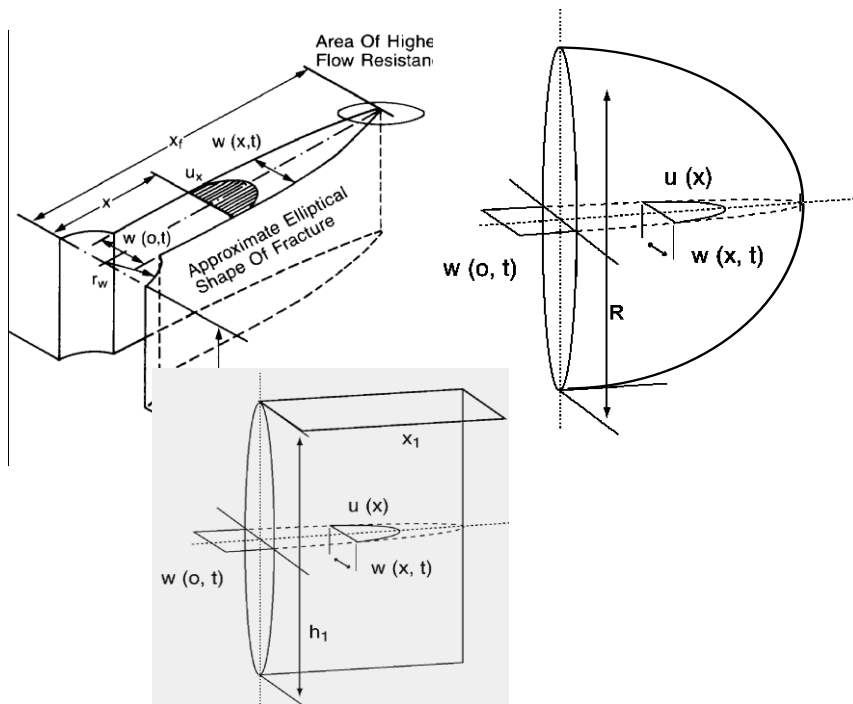
- Pumping equipment availability
- Fracturing materials performance
- Proppant flowback and erosion of surface facilities
- Modelling and technical understanding of the technique

# Evolution of Stimulation Equipment

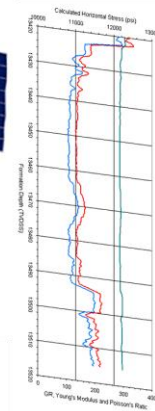
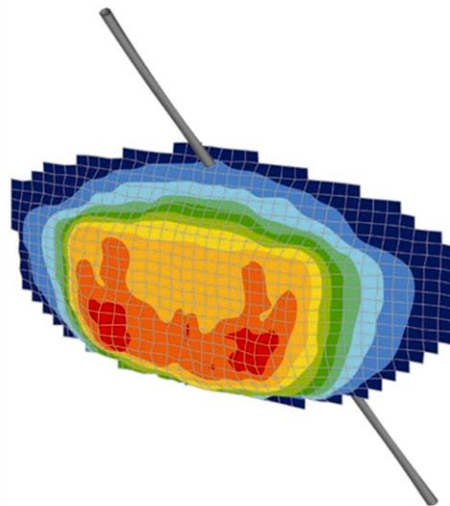
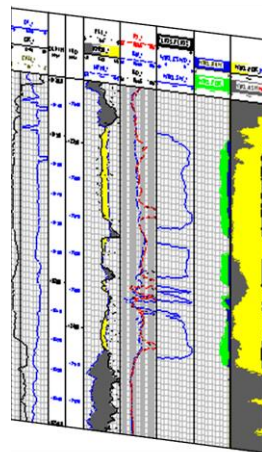


# Evolution of Fracturing Design Models

## Traditional Analytical Models



## Modern P3D Numerical Models

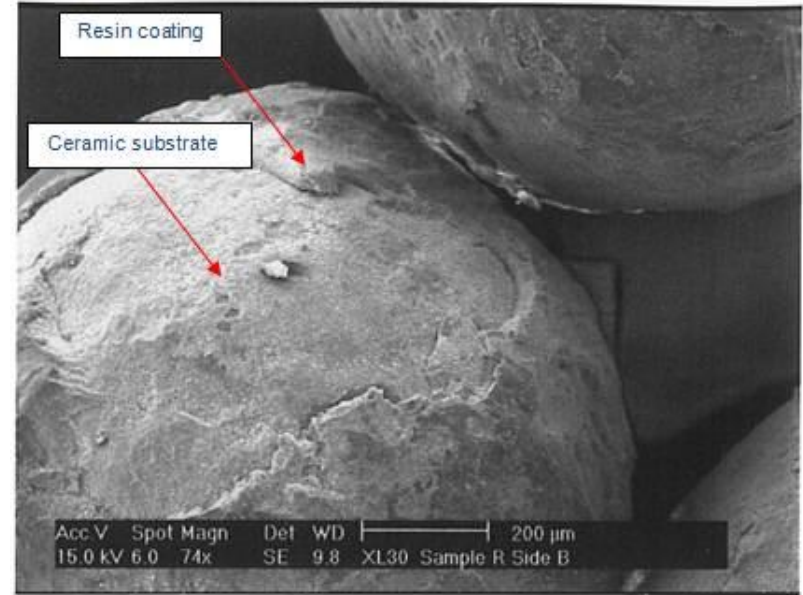


# The Transition to Multistage Fractured Horizontal Wells



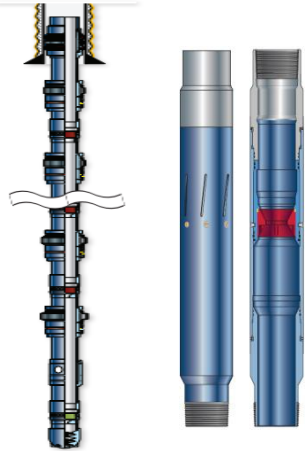
# Evolution of Technologies – Resin Coated Proppant

- Resin coated proppant has completely removed the proppant flowback issue
- The triple coating allows the proppant to bond when subjected to both pressure and stress
- Due to its outer cured coating the proppant does not bond if not subjected to mechanical pressure eliminating the risk of proppant binding in the wellbore
- Resin coated proppant has been successfully used in fracturing both platform and subsea wells





## Multistage Stimulation Systems



## Channel Fracturing



## Seawater Fracturing Fluid



# Thank you!!!

## **Co-authors:**

Christopher BARRETT, DEA;  
Brian HOLLAND, Centrica Energy;  
Marc LANGFORD, Centrica Energy;  
Kenneth MCINTOSH, EON;  
Gerrit Nitters, NPCI;  
Mark NORRIS, Schlumberger;  
Karine ORSKI, Total E&P;  
Michael PITTS, Maersk Oil;

