

Technology Delivery

John Kozicz
Transocean

Technology Delivery

▶ Drivers

- Improve QHSE
- Improve efficiency of existing process
- Eliminate steps/activities in the process
- Problem mitigation / Reliability enhancement
- Enable / Facilitate deployment of new processes

Technology Delivery

- ▶ **Challenges:**
 - **Problem Diversity**

Diversity of regions, fields / challenges and working relationships makes uniform approach to Technology based solution deployment difficult.

No Universal Single Solution
 - **Lack of focus**

Diversity of Technical challenges and many potential solutions resulting in lack of focus and waste of resources

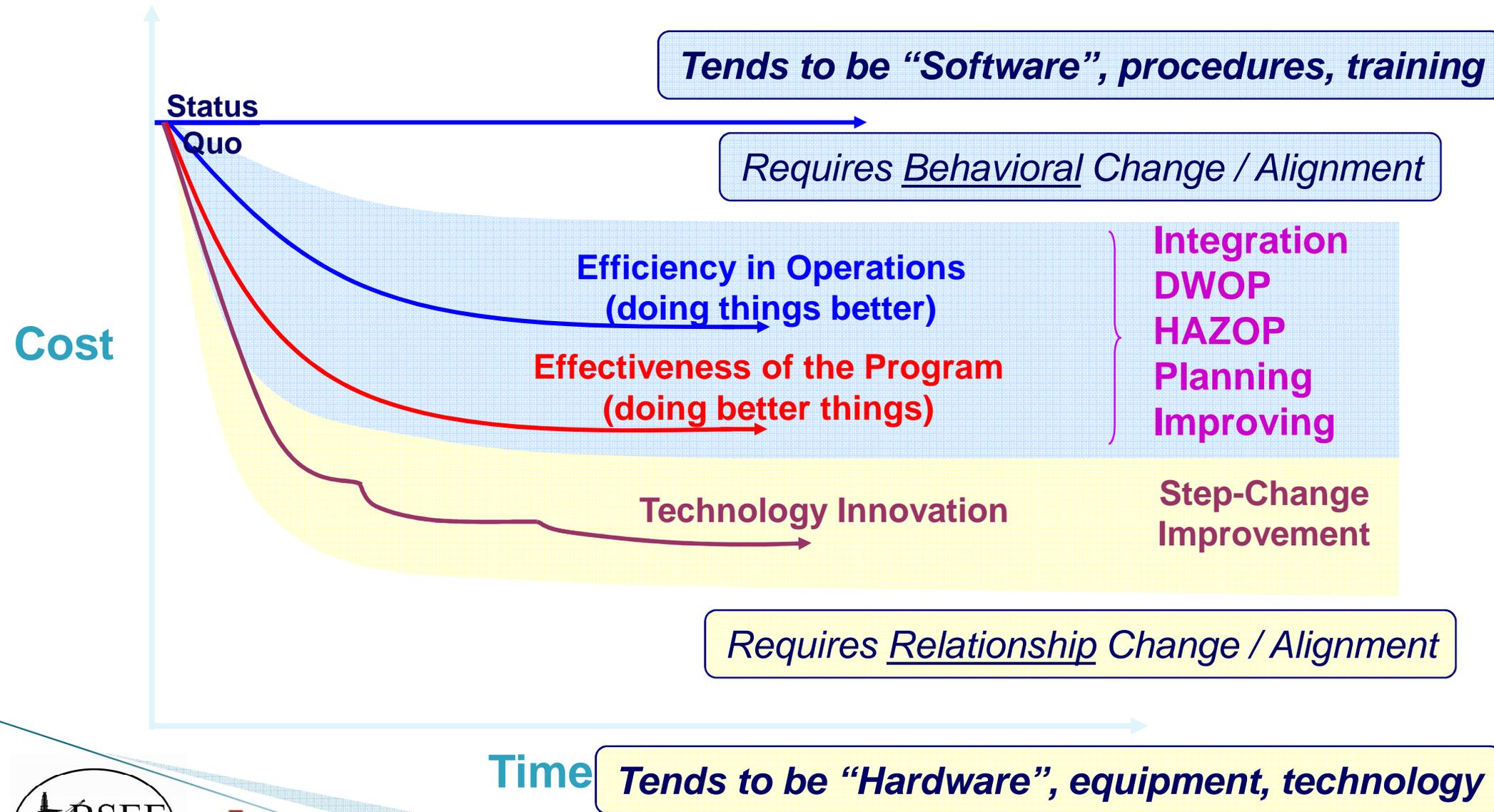
E.g. the various Dual Gradient initiatives
 - **Business Case viability**

Business Relationship
Alignment of objectives
Development Strategy

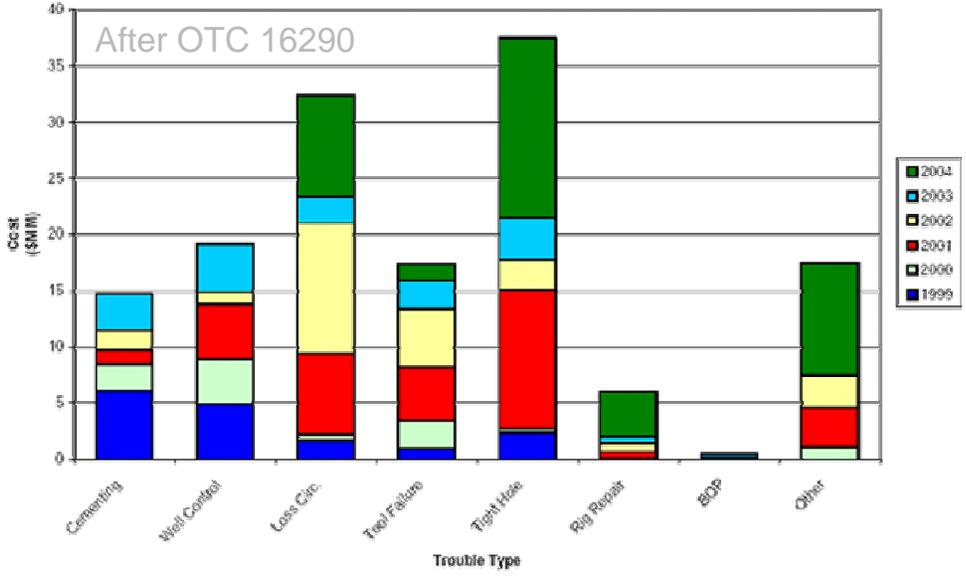
After: Dave Saul BP



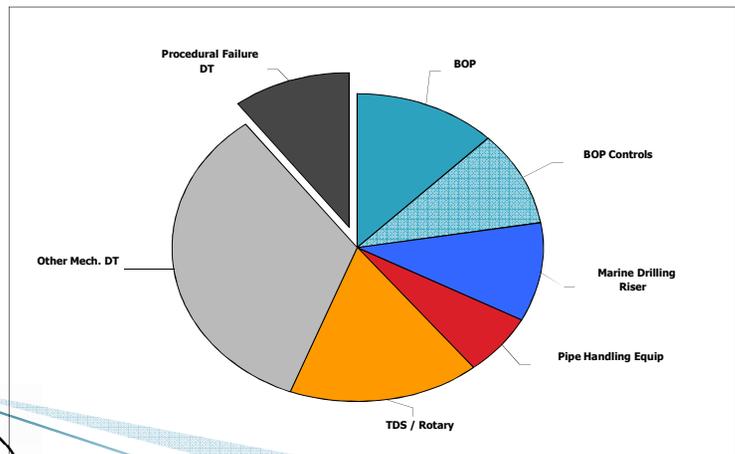
Technology Delivery



Focusing our Technology Efforts



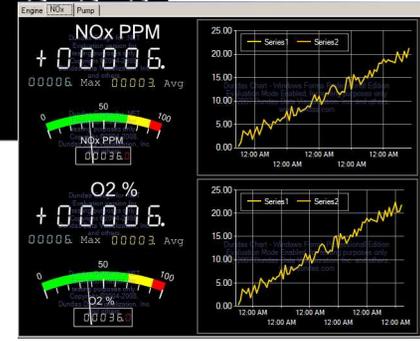
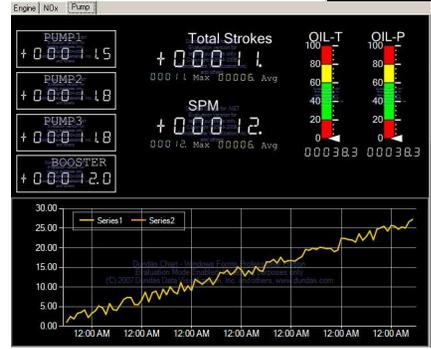
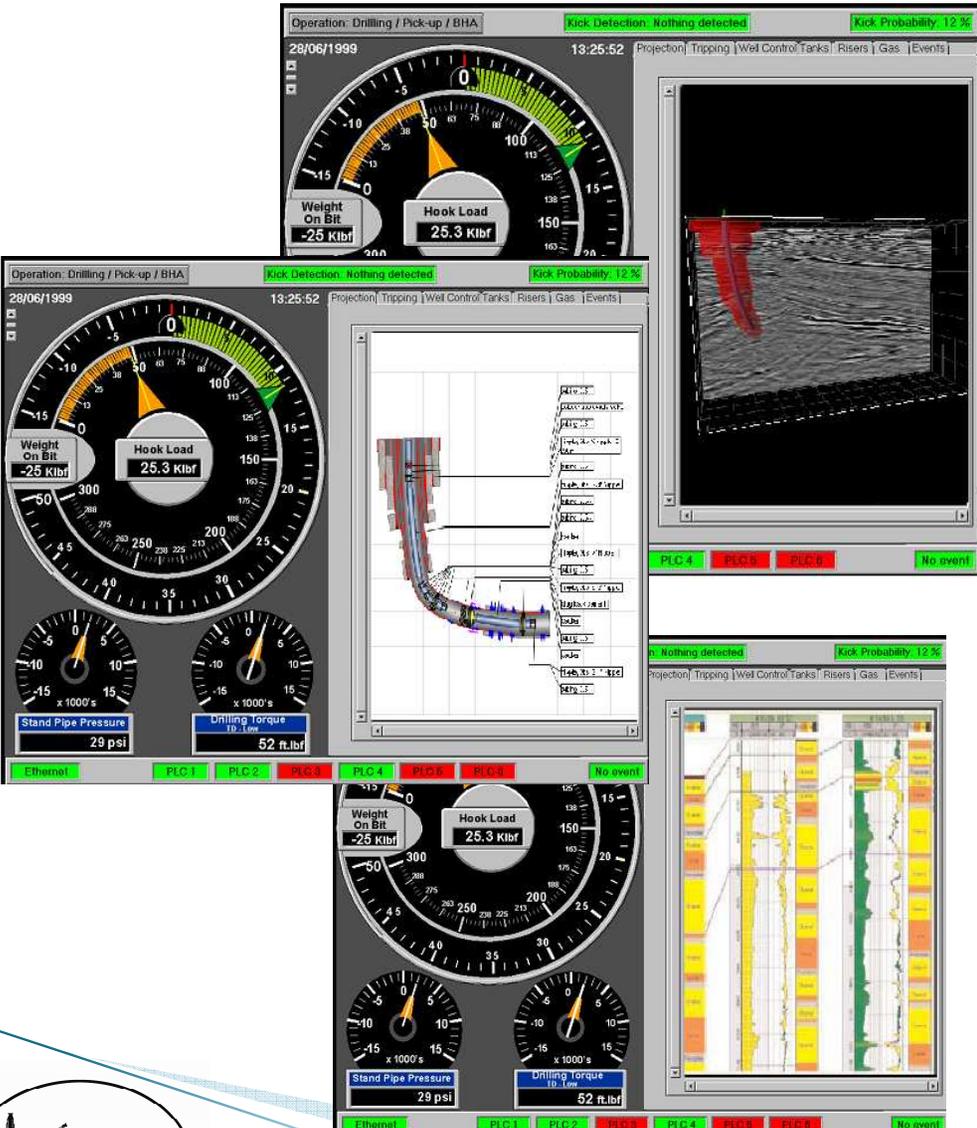
External Measures
Pan-Industry
Challenge:
Total NPT:
 ~ 27 % Total time
 ~ 25 % Total cost



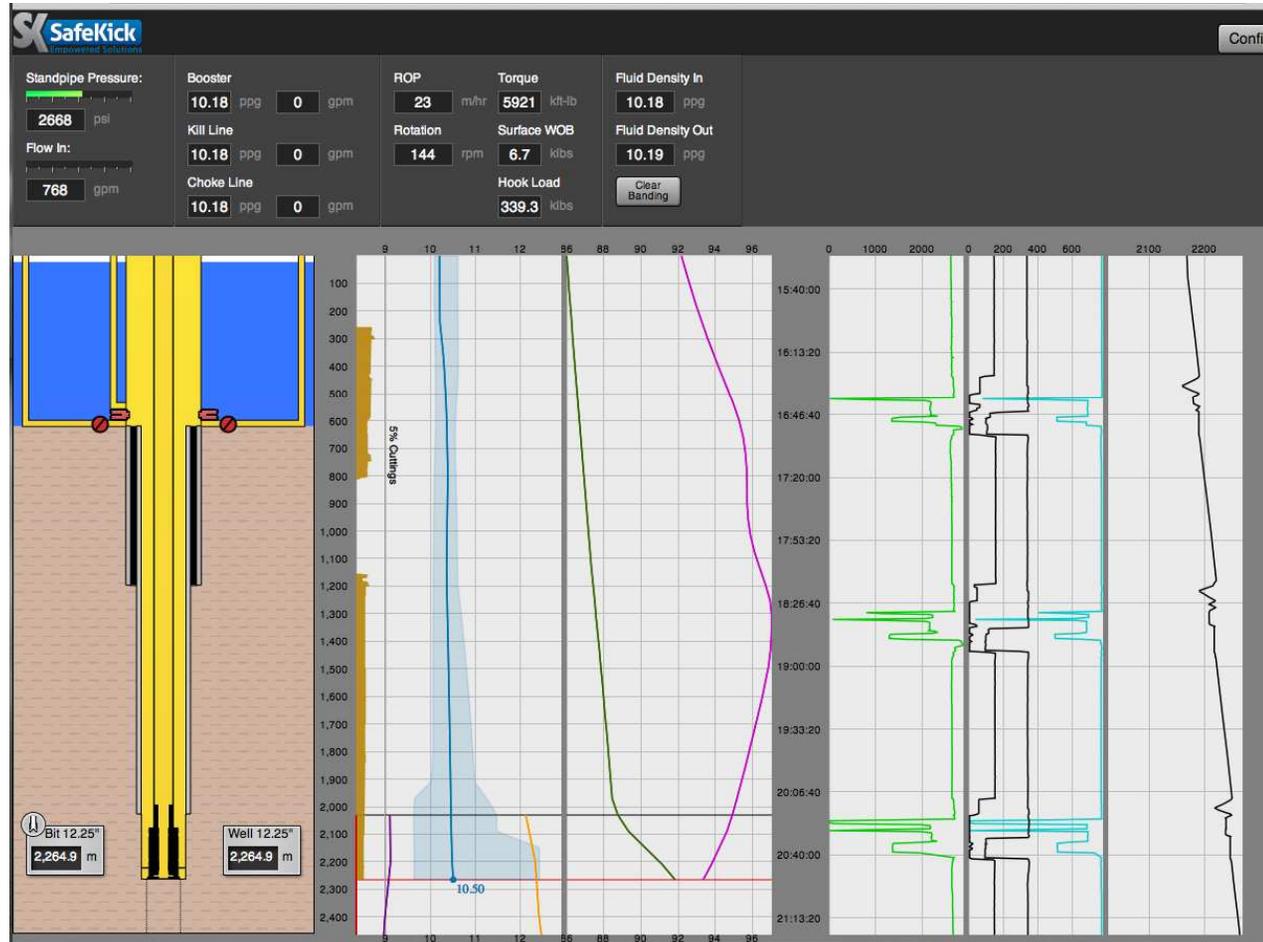
Internal Measures
KPI's
 QHSE
 Uptime / Availability
 Performance



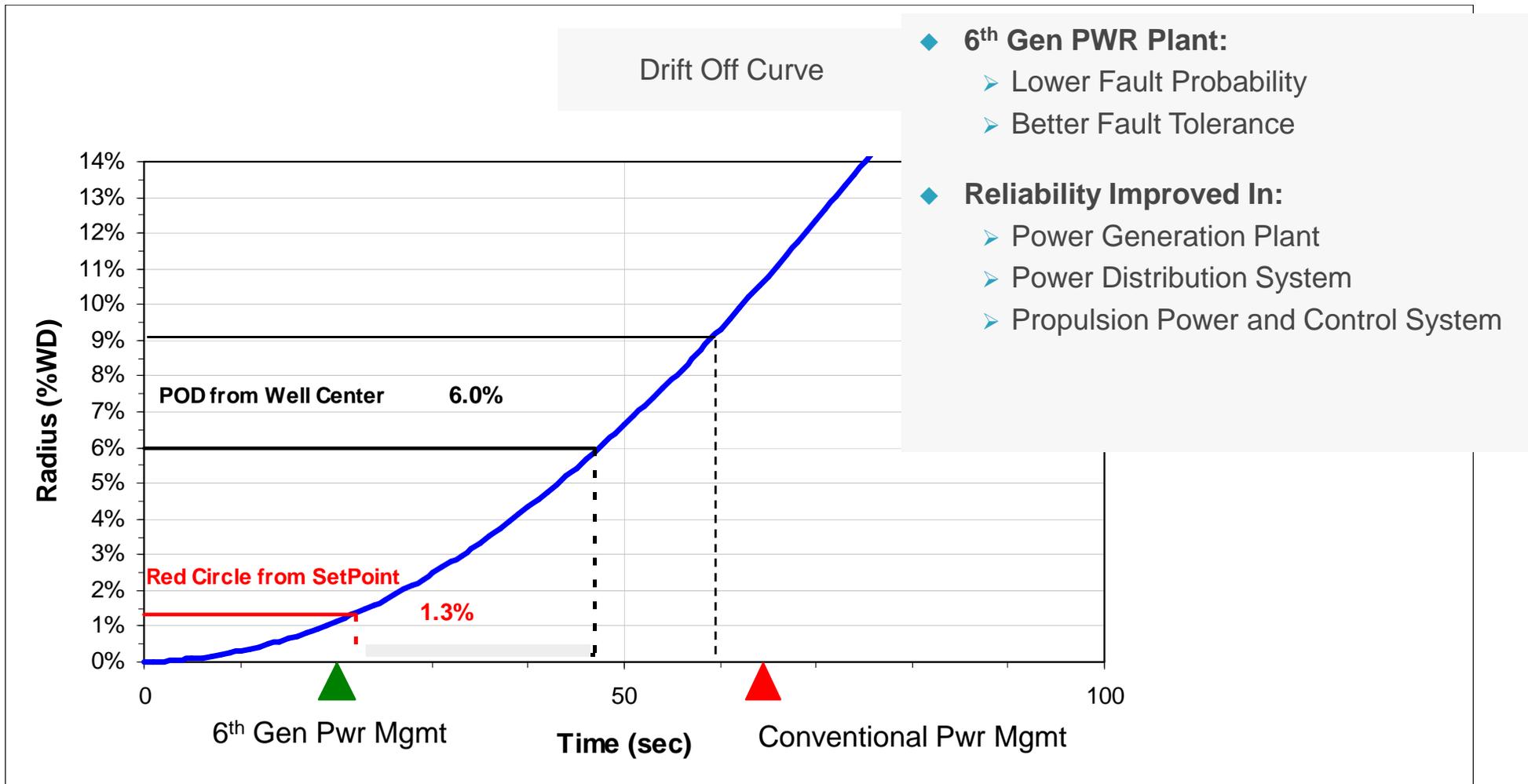
Doing things better – Enhanced Decision Support



Situational awareness- integrated Realtime well/drilling simulation



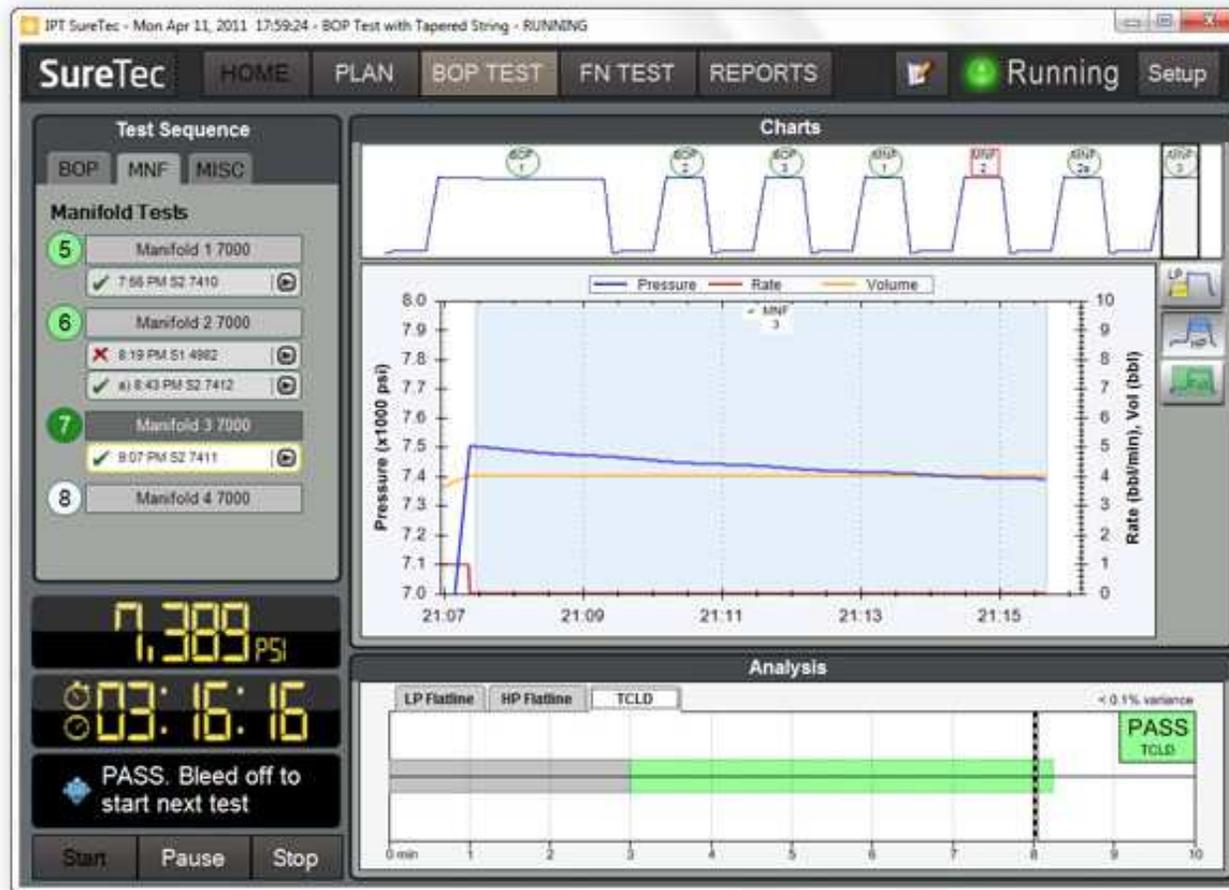
Improving Reliability 6th Generation Power Management



Typical SS Drift Off Curve NNS: wd 500m w 30 m/s, hs 15m, v 1 m/s



Enhanced Decision Support – improved interpretation- temperature compensated Pressure testing



Technology Development – MPD/RDG



Integrated, Reconfigurable Riser MPD/RDG Pup Joint



MPD / RDG – riser configurations

- ▶ Pressure control equipment above tension ring
- ▶ Pressure control equipment below tension ring
- ▶ Deployment
 - All equipment passes through rotary table
 - Currently requires 60” or larger rotary
 - May require multipart slip joint
 - Rig up in moonpool above tension ring
 - OK for 49 ½” rotary
 - Requires multipart slip joint

MPD/RDG Riser Configuration Options



Integrated RCD (moored)
49 ½ rotary



Integrated RCD (DP, moored)
Below Tension Ring



Integrated RCD (DP, moored)
Above Tension Ring



Patent 7,866,399



Transocean's "universal" MPD / RDG -system



Riser Pressure Control System
for
Riser Gas Handling



RPC assembly: key features for Riser Gas Handling



- ✓ Rated to 3000 psi pressure
- ✓ Rated to 3,500,000 lbs tension
- ✓ 3000 gpm flow rating with dual 6" ID bore lines
- ✓ Hoses rated to API spec 17 K / ISO 1362-10
 - Two 6" full bore hoses
 - Rated for mud with drill cuttings, gas and H₂S
 - Rated for moonpool service & decompression
- ✓ Triple spherical annular preventers
- ✓ Full closure capability without drillstring in hole
- ✓ End connections integral with riser
- ✓ Compact design which can be run through:
 - 49" rotary table and diverter housing
 - Tensioner ring with 47" restriction
- ✓ Accumulators for lower annular on flowspool
- ✓ Surge bottles for annulars on flowspool
- ✓ Dual riser isolation valves with remote controls
- ✓ One valve on each 6" line can be used as emergency choke for gas handling
- ✓ 4" safety valve for overpressure protection
- ✓ Automated activation with manual override

The proposed design option for Transocean will have the RDD & the Flow spool integrated into one single unit with the same riser flanges top and bottom as the rig riser system. This will simplify handling and minimize the time required for running in. The RPC design allows it to be operated below the water line without compromising on the safety or operating parameters.

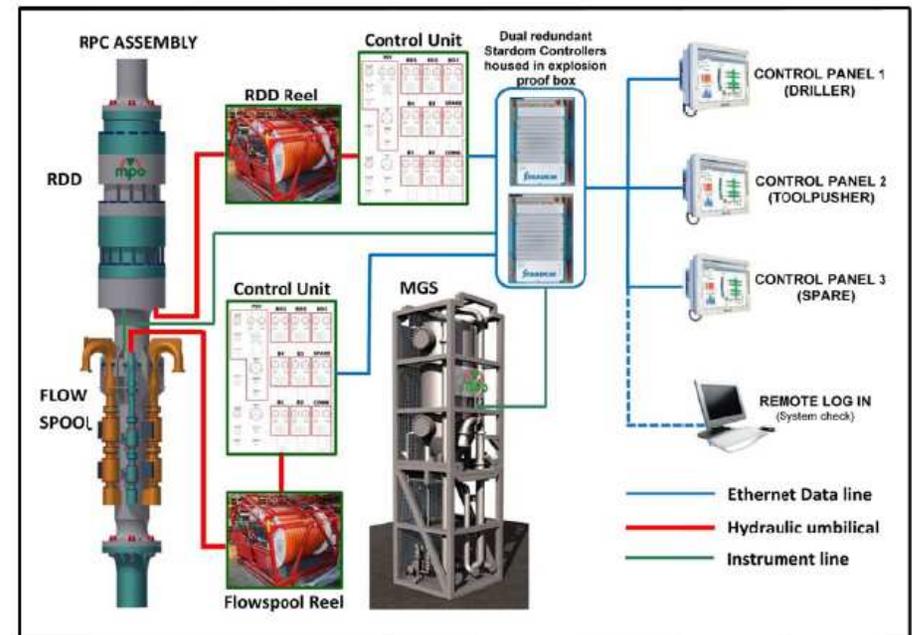


Fig 23: Simplified Control system set up

System Performance using WBM

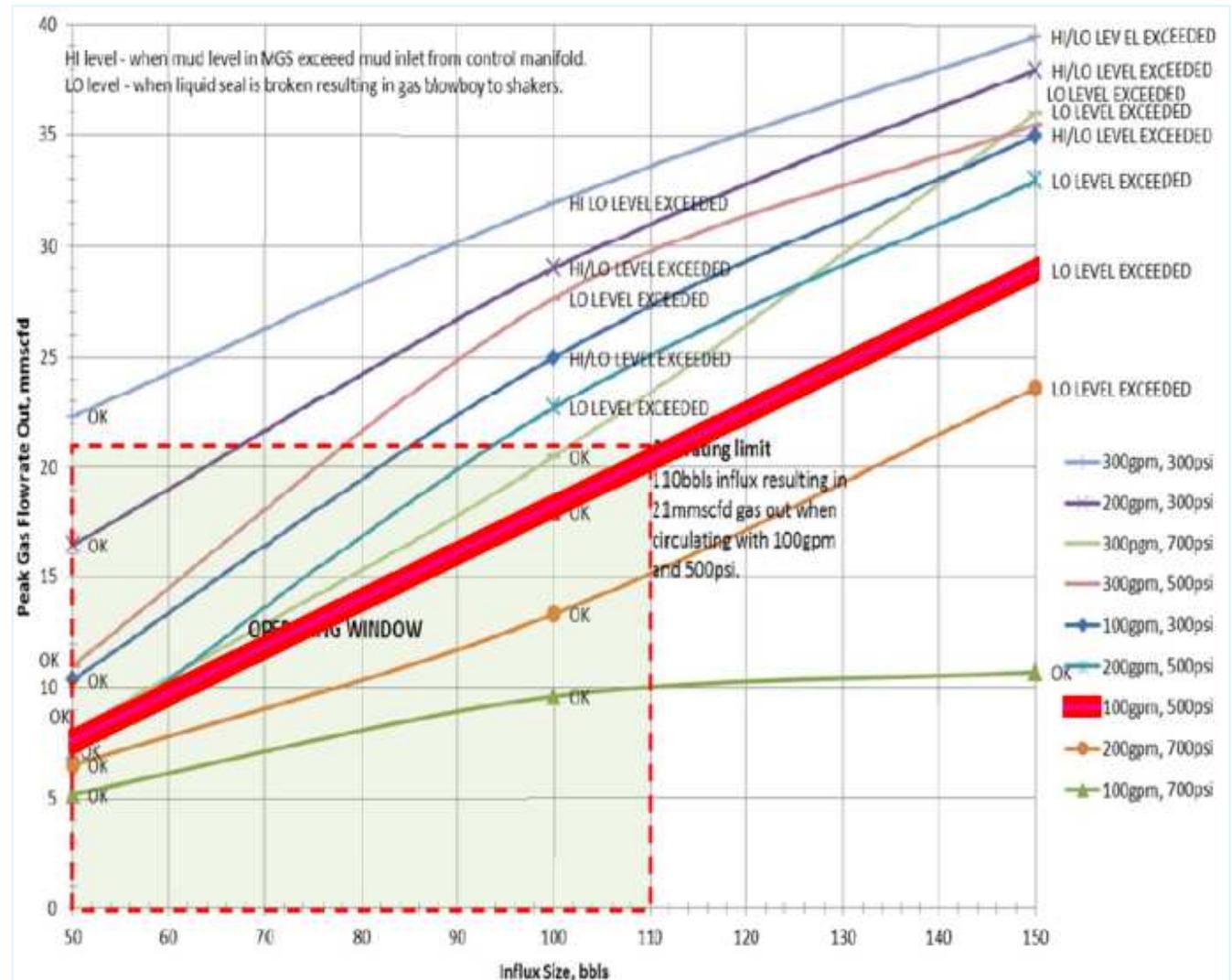
Simulation Details

- Gas Influx passes BOP at 2,000m (6,562ft) water depth
 - 12ppg WBM
- SPT Drillbench Kick Circulation transient simulator software



Simulation Results

- System can safely circulate a 110 BBL Influx through the system's MGS (110 BBL Influx @ BOP)
 - 500 psi back pressure is maintained by the RPC system
- System can circulate the Influx out at a rate of 100 gpm



System Performance using OBM

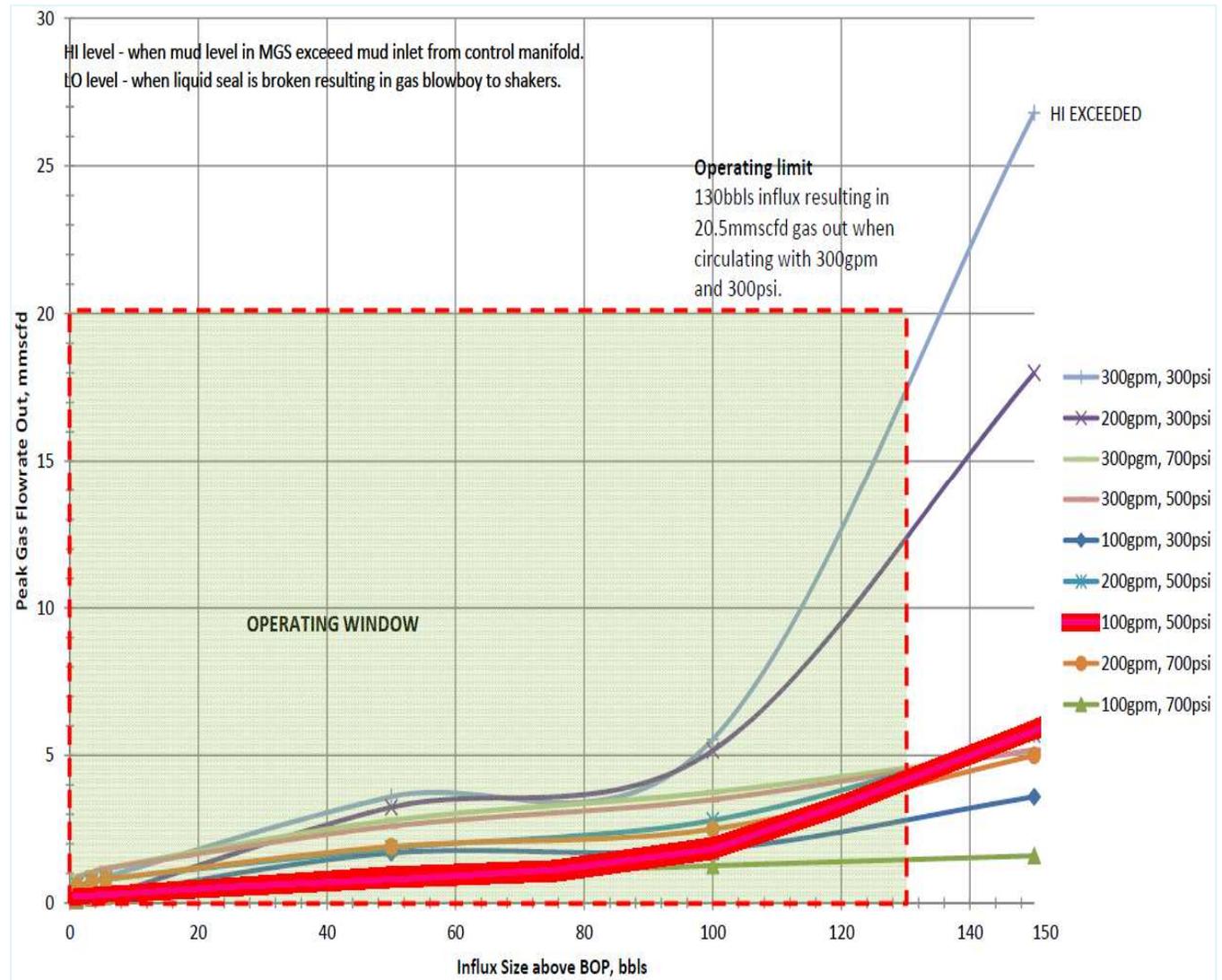
Simulation Details

- Gas Influx passes BOP at 2286m (7500ft) water depth
 - 12.3ppg OBM
- SPT Drillbench Kick Circulation transient simulator software

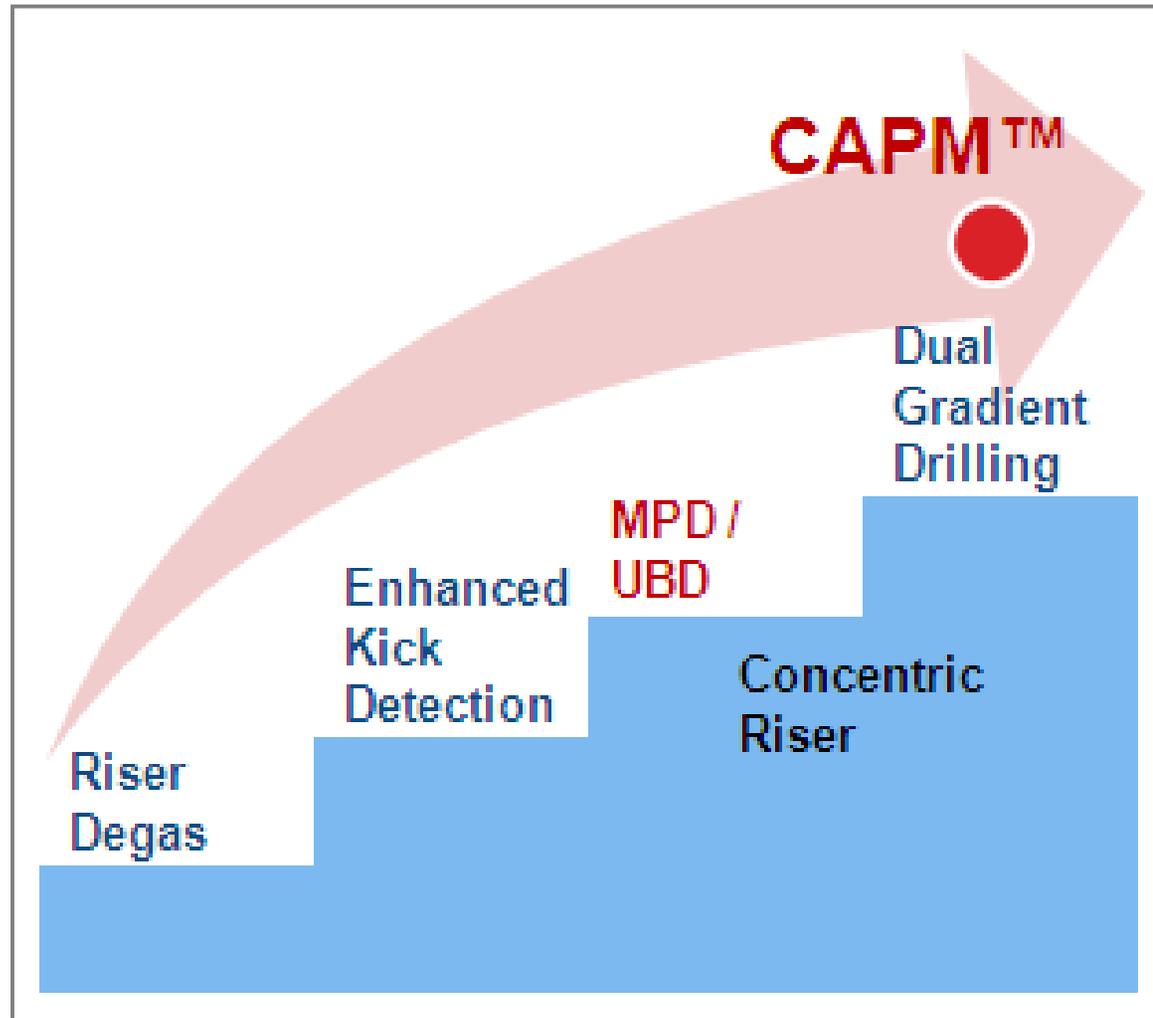


Simulation Results

- System can safely circulate a +150 BBL Influx through the system's MGS (+150 BBL Influx @ BOP)
 - 500 psi back pressure is maintained by the RPC system
- System can circulate the Influx out at a rate of 100 - 300 gpm



Managed Pressure Drilling (MPD) at Transocean



- A phased approach