Intelligent Completions Improves Economics of Brazilian Pre-Salt Development

Desiderio Rodrigues
Co-Authors: Minassa L., Costa L., Silva R., Bonfim A.

HALLIBURTON

© 2016 Halliburton. All Rights Reserved.

Intelligent Completion

Remote monitoring and control throughout the life of the field with no mechanical intervention.

- Optimization
  - Production / injection
  - Reservoir management

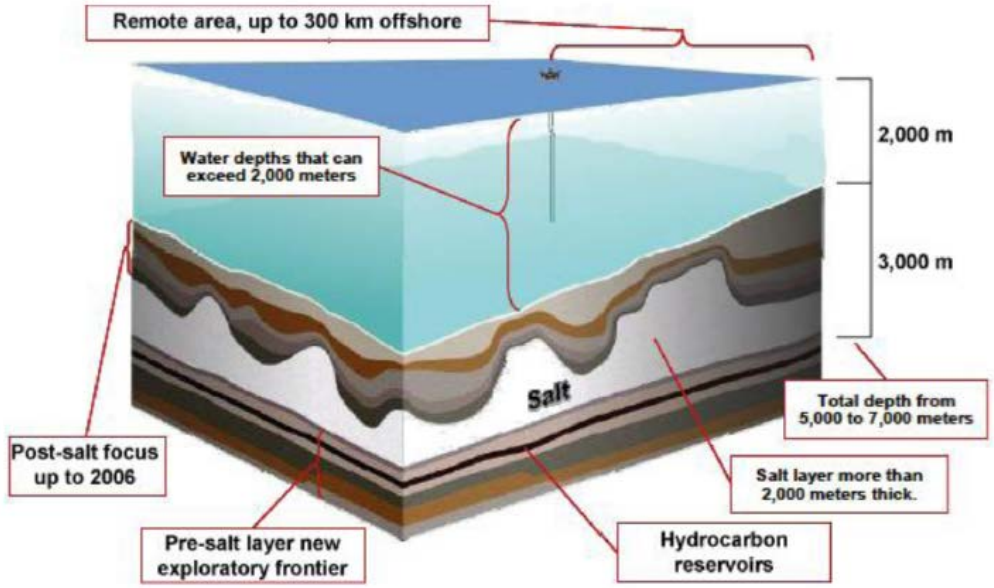
Using Intelligent Completions to improve economics…

- Reduce Asset life CAPEX & OPEX
- Mitigate reservoir uncertainty
- Manage water/gas distribution
- Accelerate production
- Increase recovery

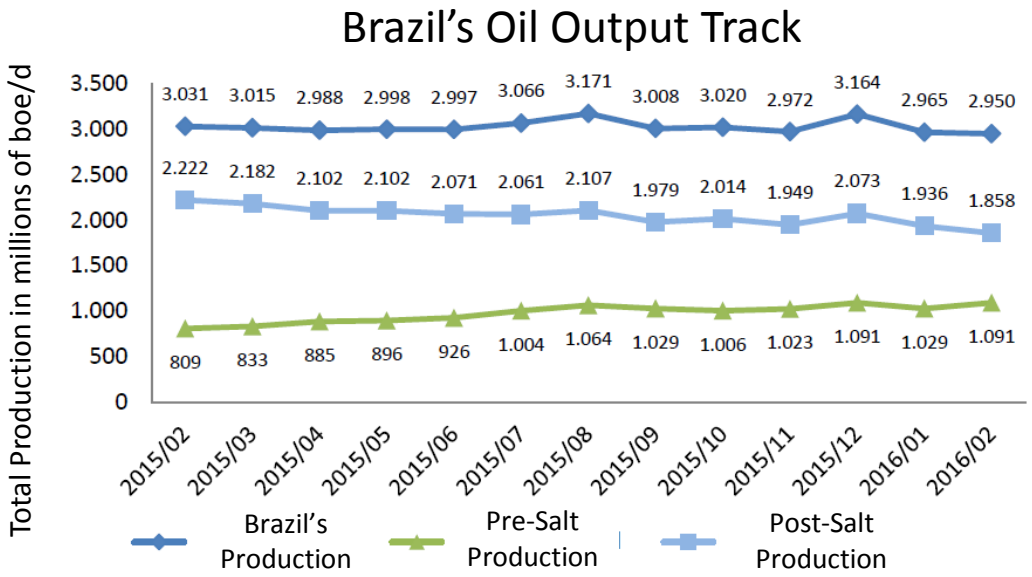
Source: http://www.catholiclane.com/falling-oil-prices-and-the-future-of-the-world-economy/

Pre-Salt Uncertainties

- Complex behavior
- High flow rates
- Variable GOR
- High CO_2 and H_2S
- Flow assurance



Source: IPTC-18521-MS

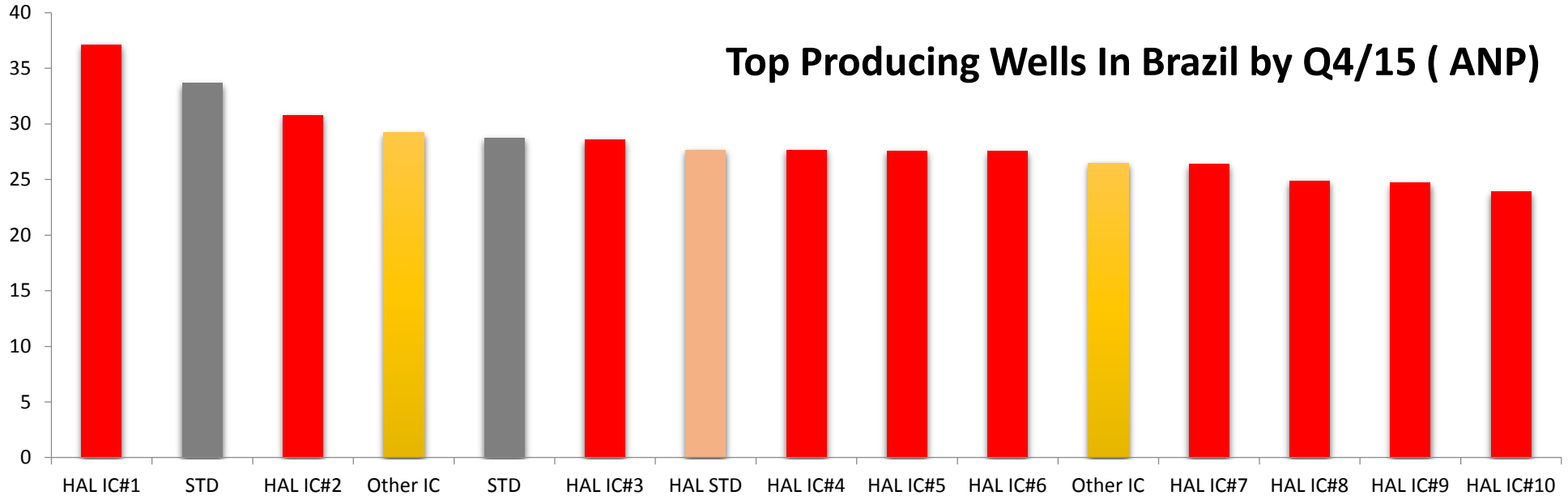


Mitigation Plan

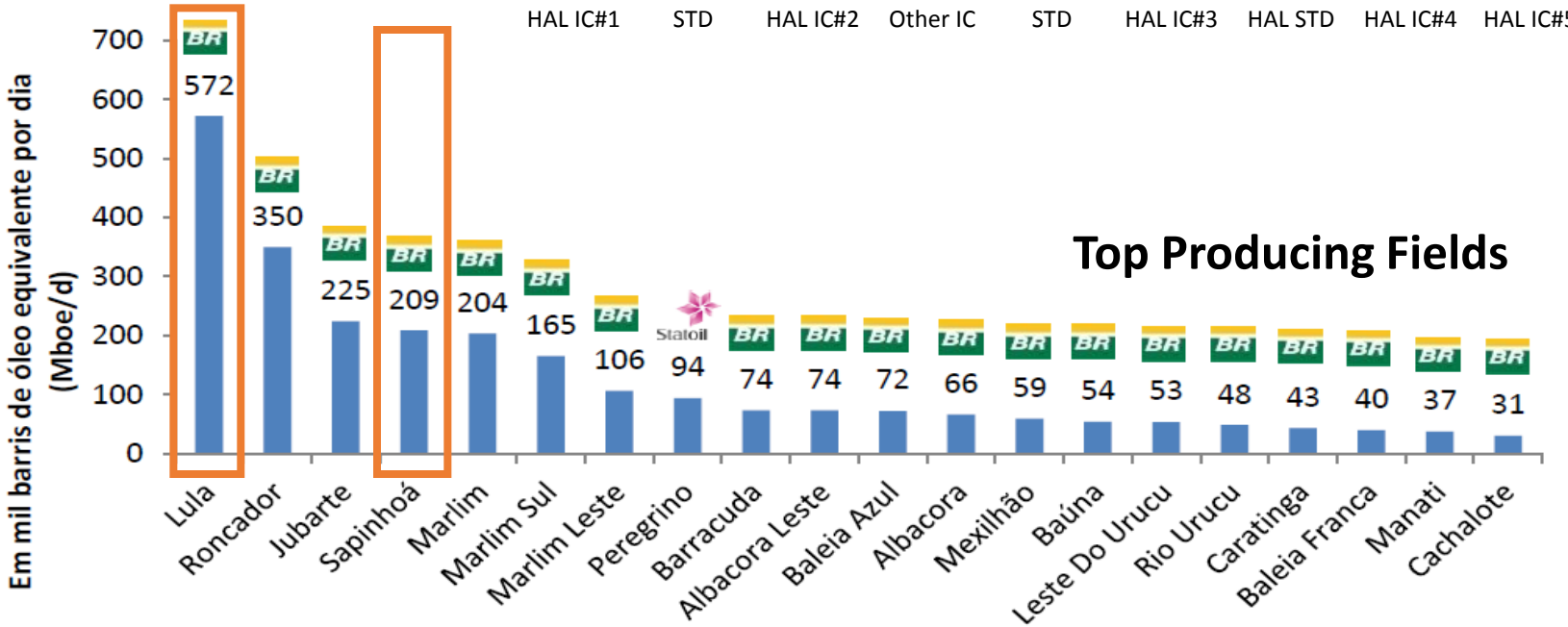
- High material grade (SDSS or higher)
- Early plan for Intelligent Completions
- Standard well designs (3 designs)
- Large volume contracts
- Very informed user

HALLIBURTON

Top Producing Wells In Brazil by Q4/15 (ANP)



Top Producing Fields



Fonte: ANP/SDP/Sigep
Dez/2015

HALLIBURTON

Notable Results

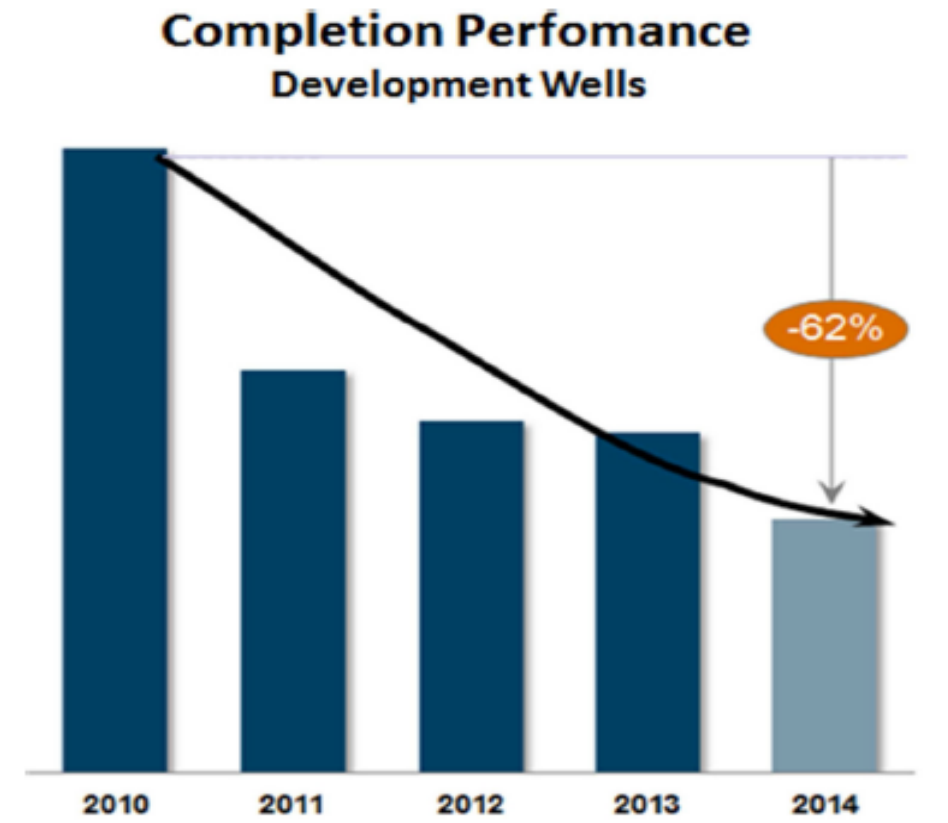
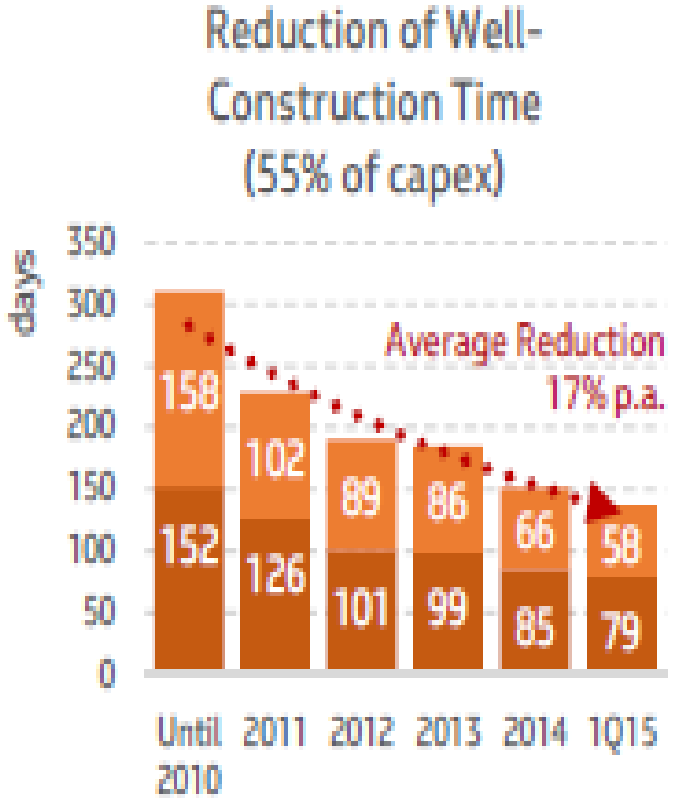
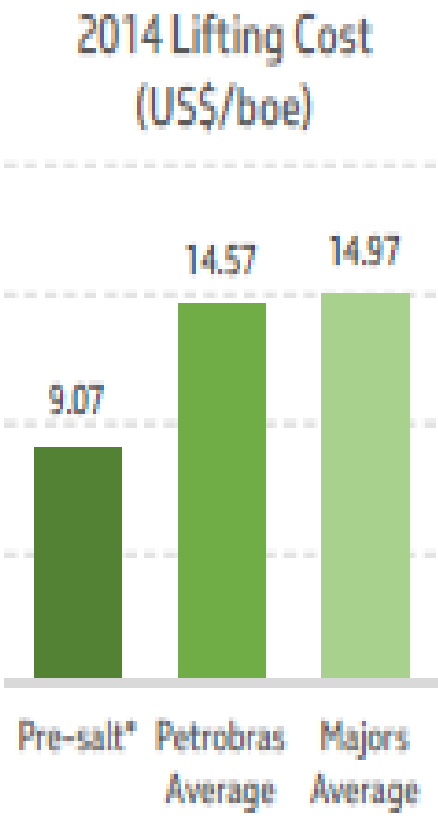


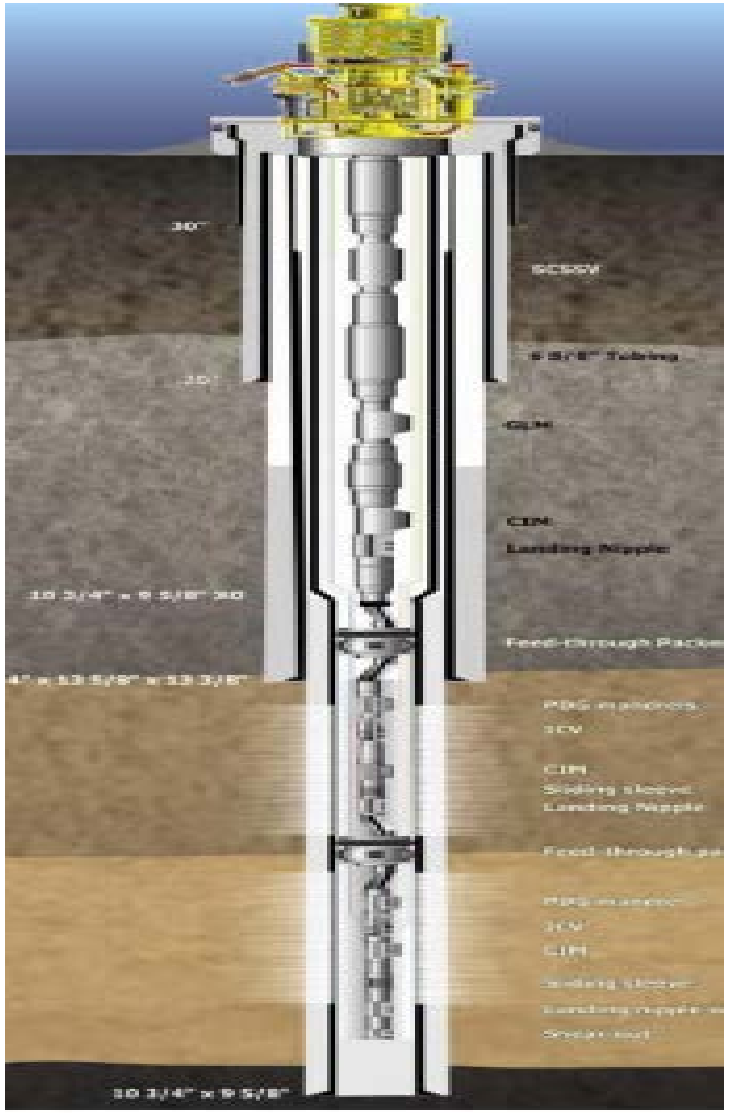
Figure 10—Mean time for completion in Lula and Sapinhoá Fields.



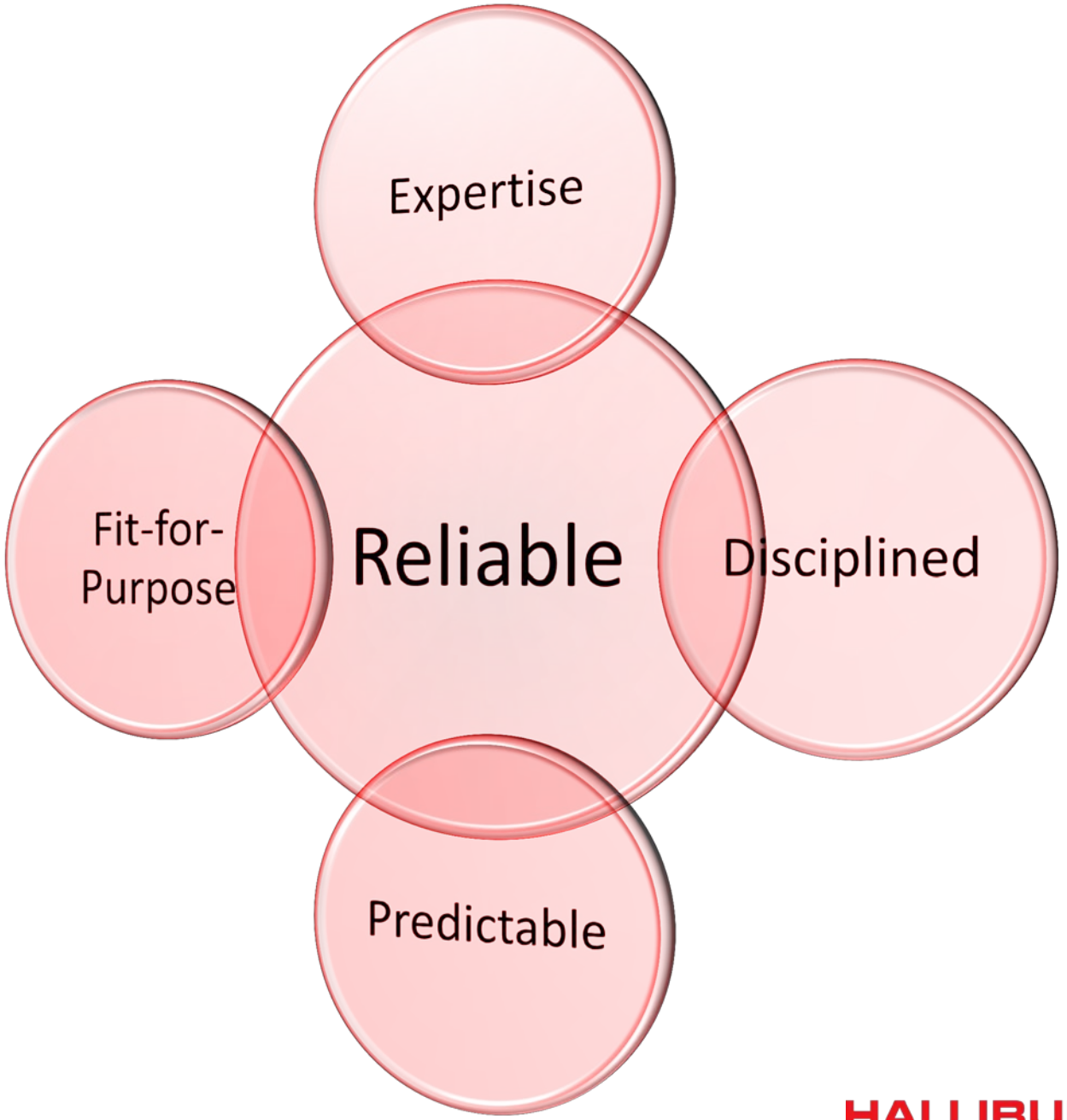


*Lula/Iracema field

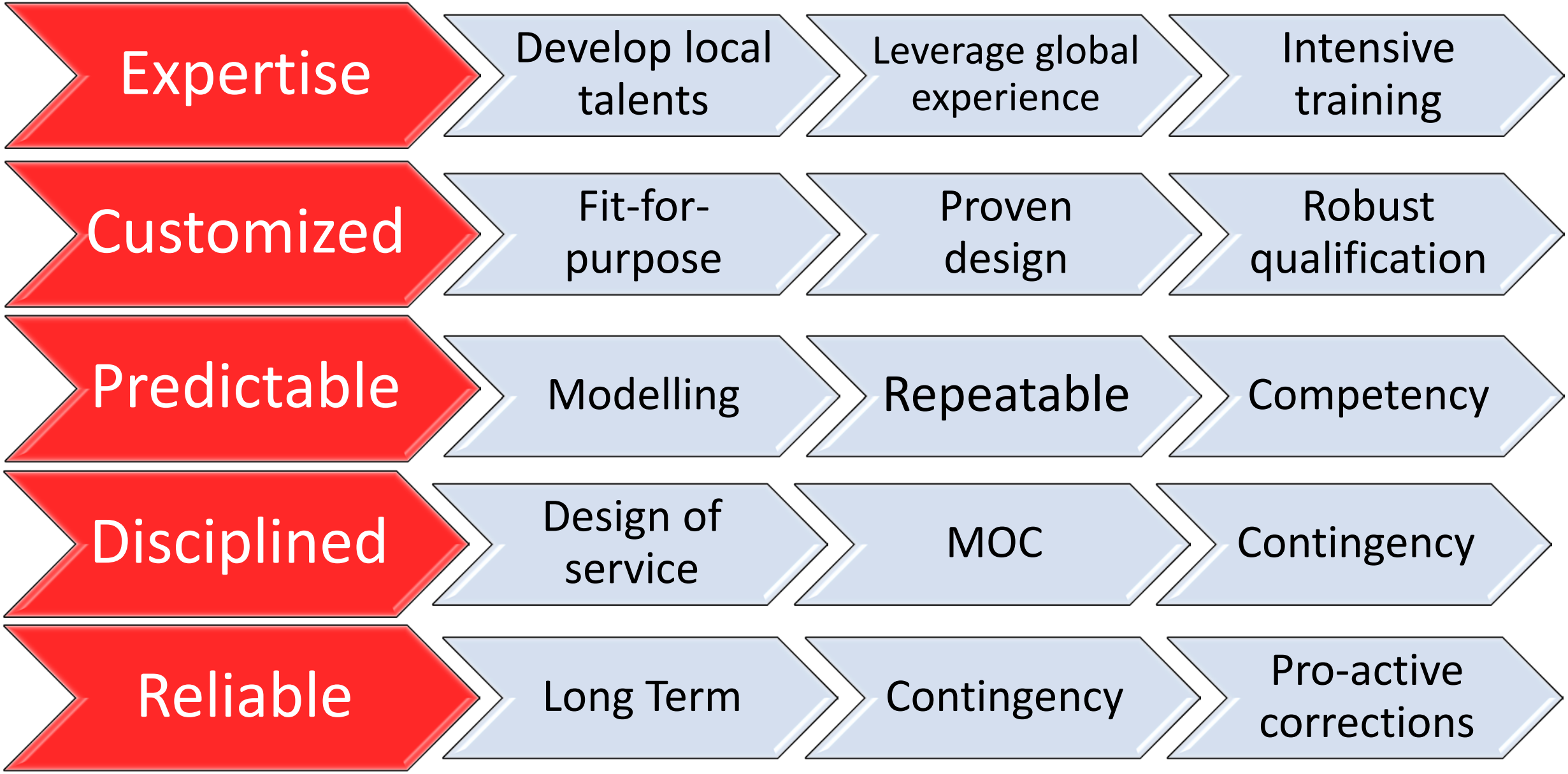
Strategy for Pre-Salt



Source: OTC 174725-MS



HALLIBURTON


Expertise
Develop local talents
Leverage global experience
Intensive training
Customized
Fit-for-purpose
Proven design
Robust qualification
Predictable
Modelling
Repeatable
Competency
Disciplined
Design of service
MOC
Contingency
Reliable
Long Term
Contingency
Pro-active corrections

HighLights

- Good Track Records (80% of total IC installed)
- Zero Equipment failures
- 95% Local personnel
- Focus on Service Quality (API Q2) 99.8% Efficiency

Lowlights

- Barriers for new technologies
- Restrictions to different well designs
- No leverage on performance
- restricted ability to overcome new challenges

Trends

- Closed loop digital oilfield solution
- Single well control system (All electric or hydrid?)
- Higher density of sensing technologies
  - Array sensing
  - Pushing P&T into reservoir
  - Downhole multiphase flow meter
- Advanced well design
  - Autonomous ICDs
  - Disconnect system
  - Open-hole Completions
  - Higher density of zones (3+ zones in DW)
  - Remotely actuated devices (wireless)

Conclusion

Intelligent Completion technology improved economics of Brazilian pre-salt:

- CAPEX reduction through optimized design and reduced installation time
- Small diference in installation time compared to conventional designs
- Acelerated production with high productive wells
- Highly reliable equipment and installation services
- Early to prove expected benefits for improved oil recovery
- Dificult to implement change in the standard designs

Acknowledgments

The author thanks Halliburton for permission to publish this study.