Key technologies for finding and developing deepwater resources

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SUMMARY: The deepwater exploration and production industry has developed over the past 40 years from its early origins in Brazil. During this time we have learned a huge amount about the geology of deepwater reservoirs and how to explore for them, about the engineering of deepwater developments and how to operate them, and about the risks we face in deepwater.

Today our industry produces about 9 mmboed from deepwater and has plans to double that by 2020.

The trend of significant deepwater discoveries has continued over the last decade, with over 250 bnboe found to date in waters deeper than 200m. Deepwater resources account for around 30% of the global conventional yet to find, indicating that we can expect to have another 20 years of deepwater discoveries at current rates. Of course many assumptions have to be realised for that future to materialise.

In terms of new plays and provinces, Brazil and Angola have lead the way along with many other deepwater areas. The clear message here is that all new plays in the last decade, except Sichuan, have come from deepwater areas. And within that deepwater category, there have been three distinct exploration themes: deltas, pre-salt rifts, and stratigraphic traps.

These discoveries will turn into production through this decade and underpin production growth. They also indicate a significant future of more discoveries.

Fundamental to that future is the continued development of technology, both to explore for new basins, plays and prospects, and to develop and produce discoveries.

In geoscience technology, our focus has been on continued improvements in seismic acquisition and imaging technology. A great example of this is The Mad Dog field in the Gulf of Mexico, where BP developed wide azimuth towed streamer acquisition, which subsequently became the industry standard for sub-salt exploration. This helped BP open up the sub-salt Paleogene play fairway leading to several material discoveries including Tiber in 2009.

In deepwater development engineering, the trend of ever increasing size and complexity of surface installations is probably near its engineering limits. The future will see a decrease in surface footprint matched by an increasing sub-sea one. This move to the sub-sea world will require a step change in several technology areas, notably power generation to operate sub-sea pumps.

Finally, a glimpse into the future. In the Gulf of Mexico, Egypt and The Caspian, BP has material resources with well-head pressures in excess of 15kpsi. While we can drill these today, the technology to produce them does not exist.

We are implementing a major technology programme to develop the next generation of technology to drill, complete and produce reservoirs at pressures in excess of our current limitation of 15,000 psi and 250F.

Such high-pressure and high-temperature requirements will necessitate significant developments in metallurgy technology and the capabilities of non-metallic components and sealing elements.

The prize is significant, in terms of both the resources we know about today and those that are yet to be found.