SILIXA
A LUNA company

Carina® Subsea 4D
ultra HD seismic

Carina Subsea 4D, the world's first permanent ultra HD in-well seismic data acquisition system for subsea wells, allows operators to perform more frequent seismic acquisitions at a much lower cost, enabling them to accelerate production and increase ultimate recovery.

The system offers ultra-high definition 4D seismic data acquisition on demand along the entire subsea wellbore without the introduction of additional operational costs and risks.

It is installed as part of the well completion.

Ultra HD seismic images around the borehole

Carina Subsea 4D can operate independently or provide complementary data to existing ocean bottom cable or ocean bottom node systems. The same seismic shots are captured by both the ocean bottom and Carina Subsea 4D, but the higher density and the wide aperture of the Constellation sensing fibre, and proximity to the reservoir, allows for higher resolution in the resulting seismic images around the borehole than those obtained from the ocean bottom receivers. This is especially true for reservoirs that are difficult to image using ocean bottom receivers, such as pre-salt reservoirs or those below gas clouds.

The underlying technology

Carina Subsea 4D offers a breakthrough performance by utilising the Carina® Sensing System, enabled by the precision engineered Constellation™ fibre, to achieve 100x improvement in signal-to-noise ratio (SNR) compared to DAS systems utilising standard fibres.

Constellation fibre is engineered with brighter backscatter centres along its length to capture and reflect 100x more light back to the interrogator without introducing significant loss to the forward propagating laser pulses. The Carina Sensing System, together with the Constellation sensing fibre, can offer a practical solution to compensate for the long tie-back fibre attenuation and connector losses in subsea installations.

No electronics on seafloor, data acquired from topside facility

Carina Subsea 4D is unique in that it does not require any complex electronics to be placed on the seafloor. Acquisitions are performed from the topside facility through existing fibres in the subsea umbilicals. Integration complexity and costs are therefore substantially reduced, and data management simplified.

Interrogators can easily be maintained and upgraded. The long offset distance between the surface interrogator and subsea well does not compromise data quality; the Constellation fibre optic cable and novel optical architectures allow the same high-quality data to be achieved as on existing land and platform systems.

Key benefits

- **Full wellbore coverage**
  Acquire data along the entire wellbore for every seismic shot

- **Ultra HD data quality enables cost effective reservoir characterisation**
  Extremely high signal to noise ratio gives seismic data quality beyond that of a standard geophone array

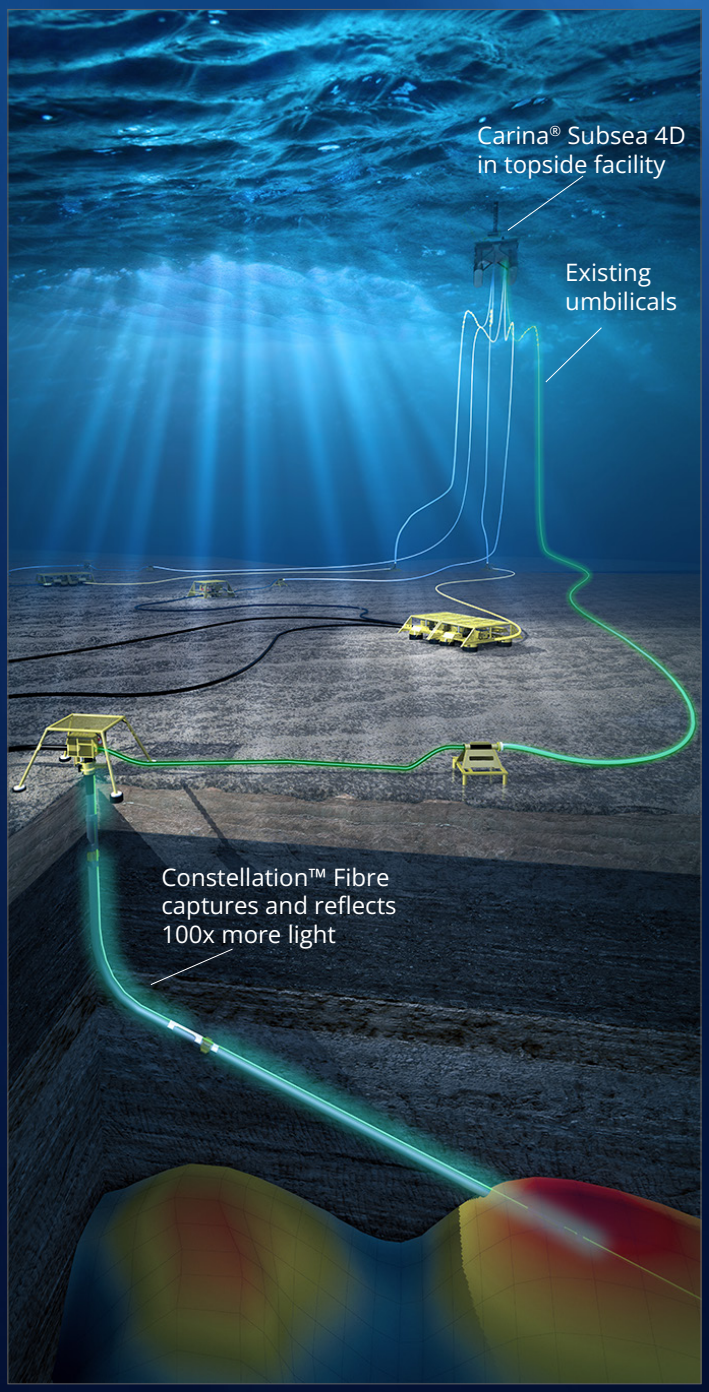
- **Borehole seismic for the fraction of the cost**
  High signal to noise ratio enables seismic surveys with either reduced source effort or fewer shots, hence lowering the operation time and cost

- **Permanent installation reduces OPEX across life of well**
  Continuous data availability without need for intervention

- **Eliminate the cost of deferred production**
  Intervention-free operations allow for surveys in flowing wells

- **Increase ultimate recovery**
  Permanent installations enable 4D seismic on demand throughout the life of well

- **New powerful capabilities without further additional CAPEX**
  Continuous well diagnostics throughout the life of well



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