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Aberdeen Section

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Fiber-Optic Sensing for Field Development
Asset Integrity & Optimization Workshop

24–25th March 2026
Ardoe House Hotel,
Aberdeen, UK

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ExxonMobil

The Untapped Potential of Fiber Optic Monitoring in the Upstream

ExxonMobil

Key Takeaways

- Fiber optic monitoring: Valuable surveillance data for your assets
- Data only becomes valuable when it turns into insight and action
- Challenges in front of us: Reliability and Supply Chain
- Call for action: Industry Collaborations
- Looking forward: Significant prize ahead of us

Significant Potential Value from Fiber Monitoring

Continuous, real-time, high-resolution surveillance for wells and flowlines

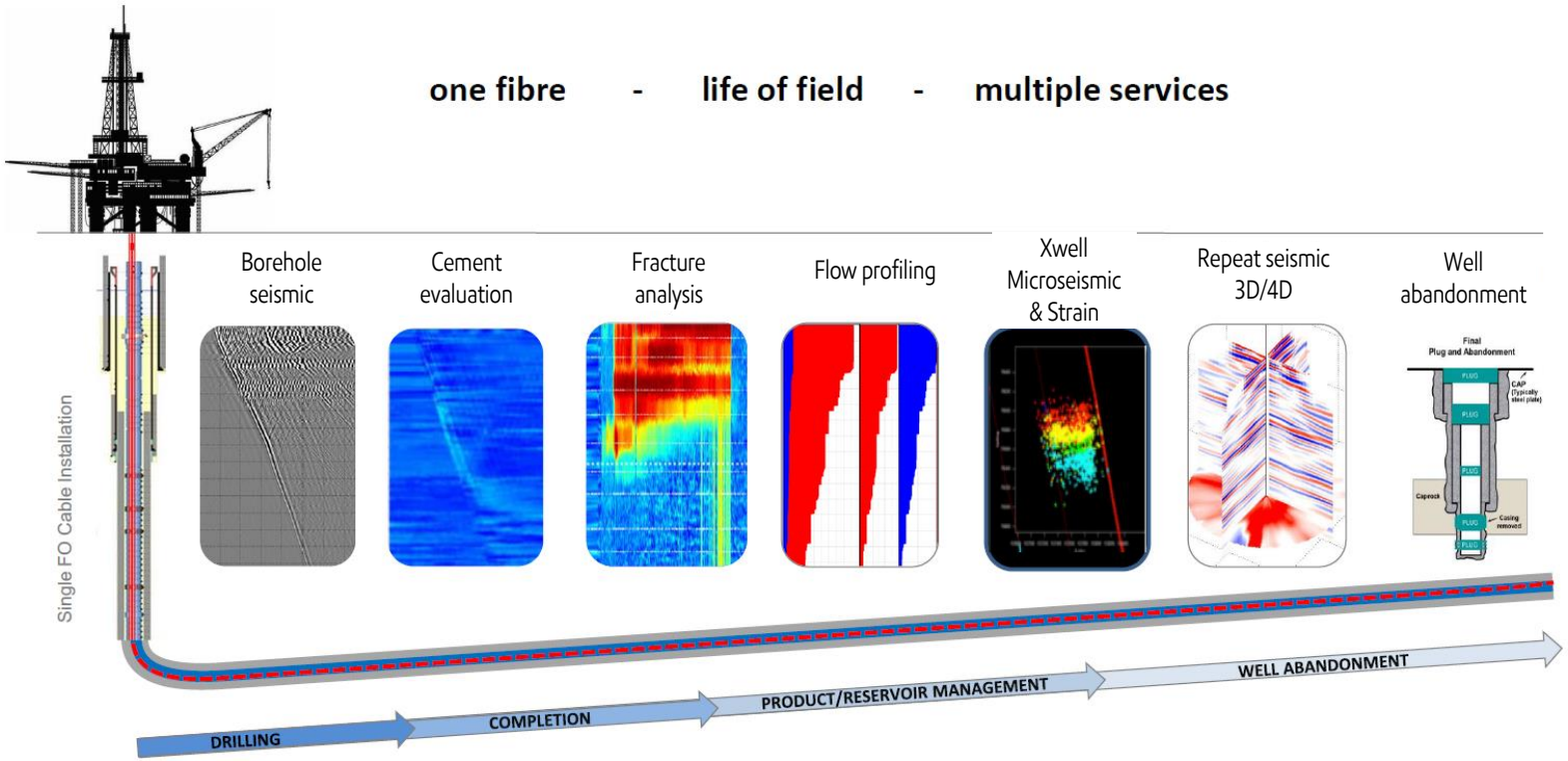


Image: 2018, SPE optical fiber workshop, Mahmoud Farhadiroushan, Silixa – used with permission

Oil and Gas

Demonstrated reliability, long life in harsh downhole environments

- Drilling and Completion: Thermal, acoustic, flow profile, fracture geometry
- Asset Integrity: Flow anomalies identification, well integrity, out of zone injection
- Operations: Gas lift optimization, active flow control, production optimization, flow assurance

Low Carbon Solutions

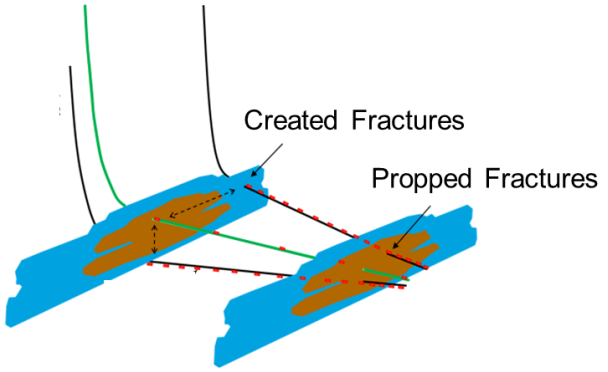
- Regulatory compliance and safe operations
- CO2, geothermal, hydrogen storage
- Pipeline monitoring, leak detection
- Zonal isolation verification, containment
- Microseismic monitoring, fracture activation / propagation

Use Case: Unconventional, Hydraulic Fracturing

Frac Geometry Characterization, Well Spacing Optimization

Fiber optics provide unique insight into the sizes and shapes of hydraulic fractures to improve capital efficiency of unconventional developments

- Vertical and slant monitor wells probe the length and height of created fractures via strain measurements
- Able to rapidly assess how improvements in completion design enhance fracture geometry
- Pressure gauge arrays in the monitor well measure depletion, validating fracture geometry interpretations



Figures reprinted from Liang, et al., 2022 (URTeC 3719696) and Benish, et al. 2024 (SPE 217825), with permission from URTeC and SPE, whose permission is required for further use

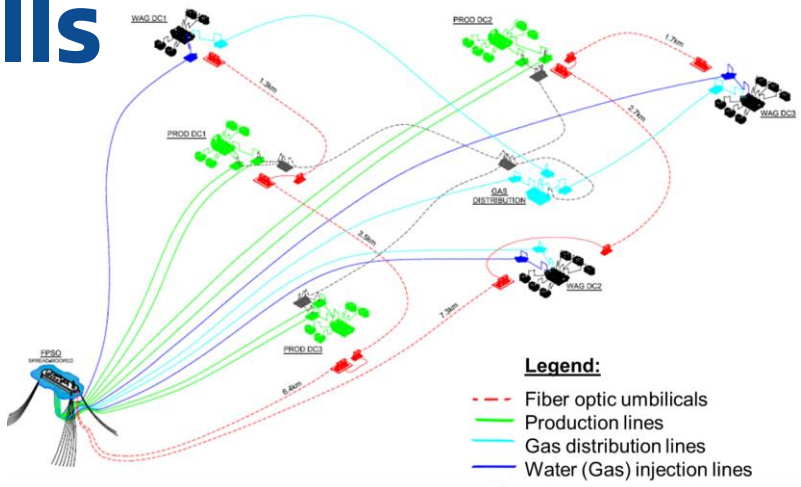
Use Case: Deepwater, Subsea Wells

Well and Reservoir Performance Monitoring, Seismic Imaging

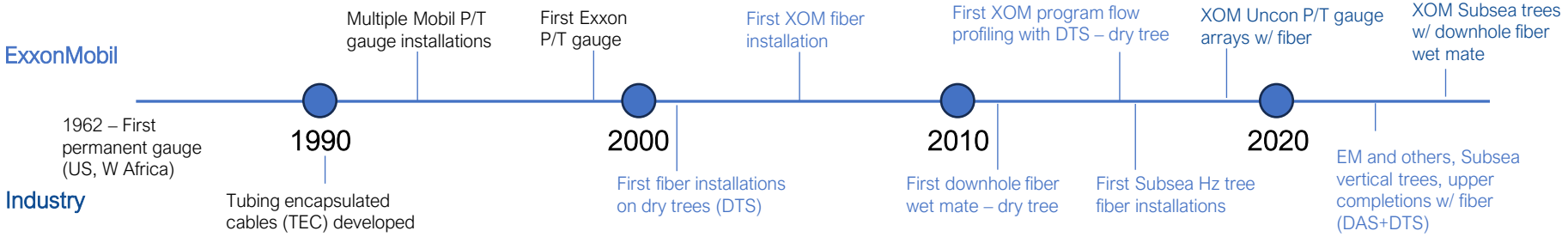
Fiber optics has the most value in DW & SS due to limited / high-cost well intervention and logging

- Continuous temperature log - essential for hydrate prevention, identification of leaks, crossflow, flow profiles along completion
- DAS supplements 4D-seismic, monitors for asphaltene and scale, equipment health, detailed flow profile

Subsea Field Layout – Including Optical Infrastructure



Monitoring Technology Maturation Timeline – from permanent P/T gauges to Fiber Optics



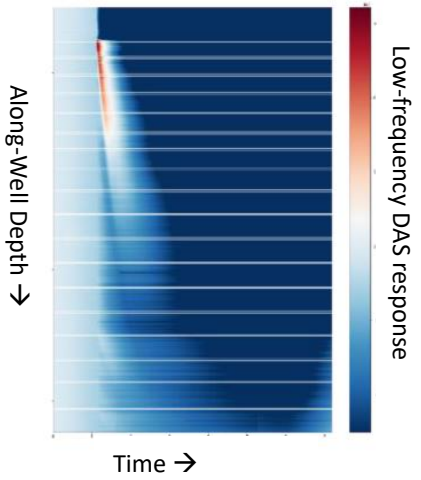
Figures from Seabrook, et al., 2019 (SEG post-conference workshop); Pankaj, et al., 2024 (OTC 35413); whose permission is required for further use

Maximize asset value through active monitoring and timely actions!

Data → Insights → Actions

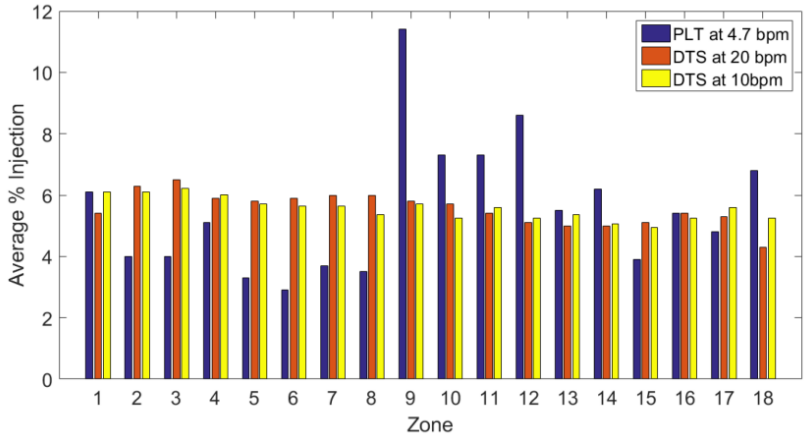
Raw DAS or DTS data

Pre-processed waterfall plots can identify qualitative trends



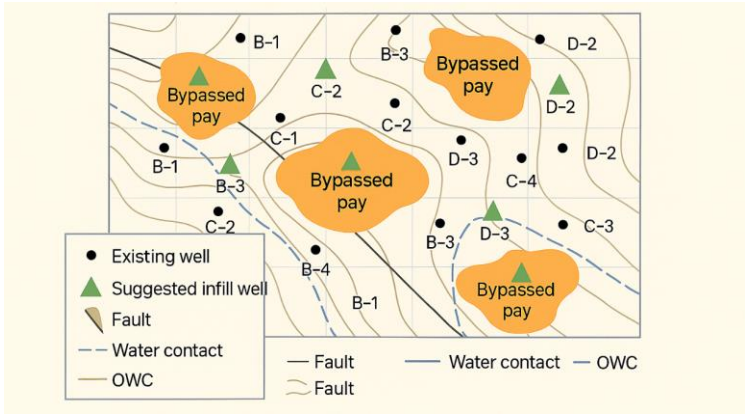
Zonal performance

Processed fiber data informs each zone's contributions over time



Infill Opportunity Identification

Bypassed pay zones derived from fiber optic data analysis



What well data do we have?

- Acoustic response
- Temperature distribution
- Pressure Gauges
- Flow meters / well tests

What can we learn from the data?

- Zonal flow distribution along reservoir
- Completion performance over time
- Gas / water breakthrough

What can we do differently?

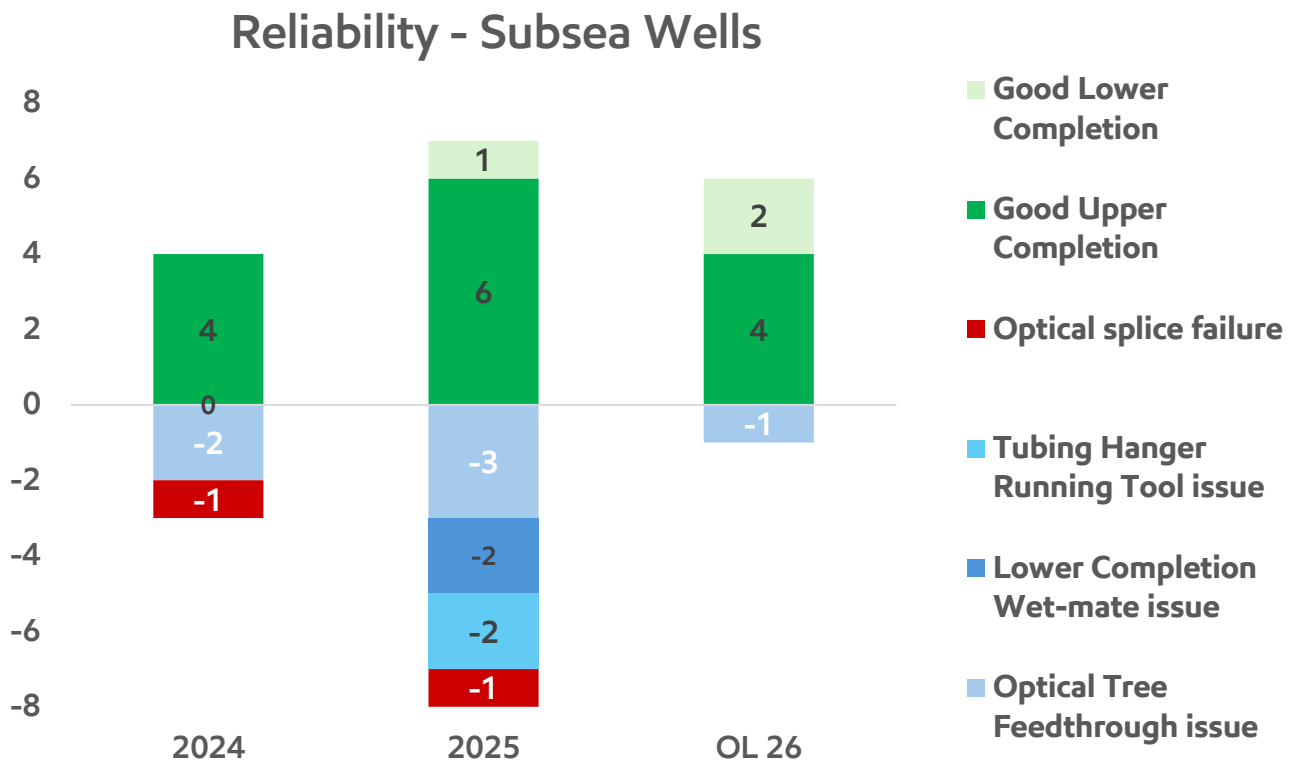
- Increase/decrease gas lift
- Active flow control
- Optimize infill well locations
- Well workover

Figures from Seabrook, et al., 2020 (SPE 203065); whose permission is required for further use

Reliability Opportunity

Optical equipment damage – mostly caught before installation

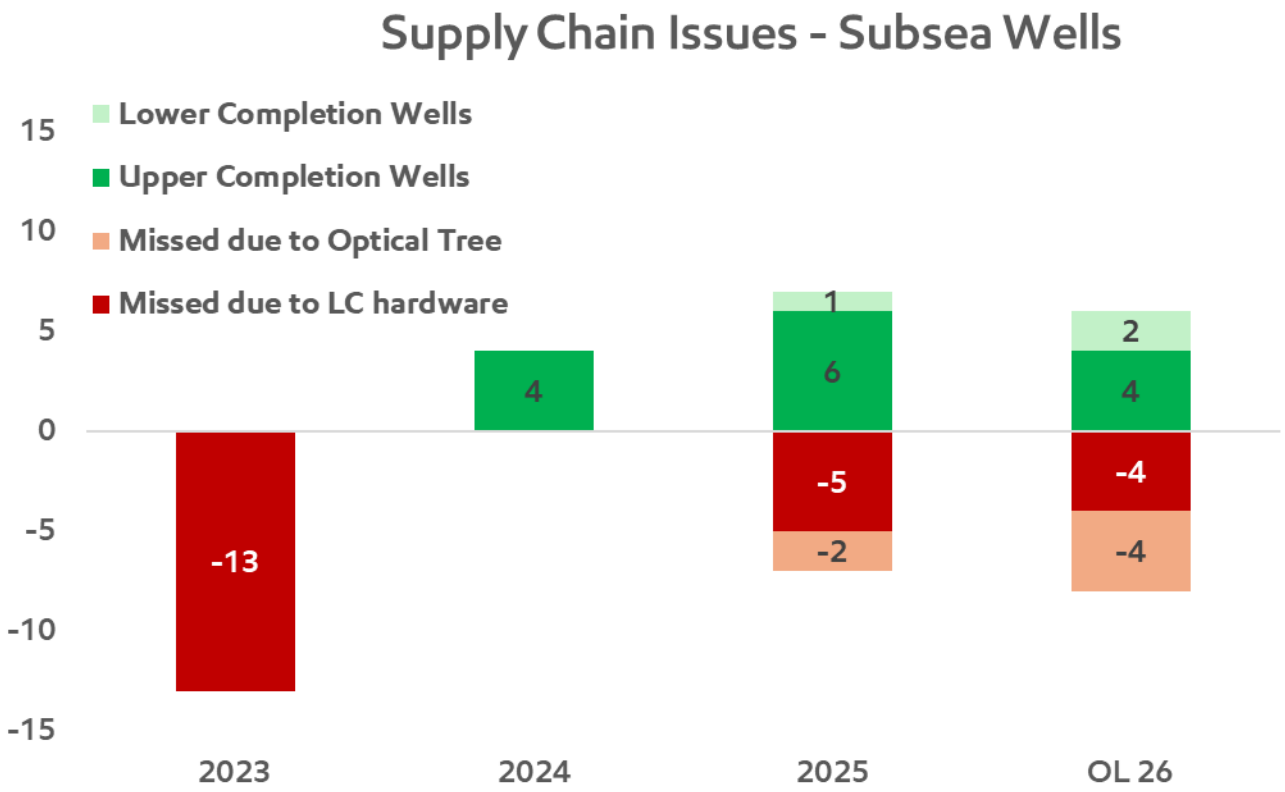
- Significant volumes of equipment required return and repair over the past two years
- Most defects were caught pre-installation, either on the rig floor or at the shorebase
- Resulting failures cased major opportunity loss and reduced well count with fiber
- In multiple wells, lack of spares forced installation of only upper completion fiber



Supply Opportunity

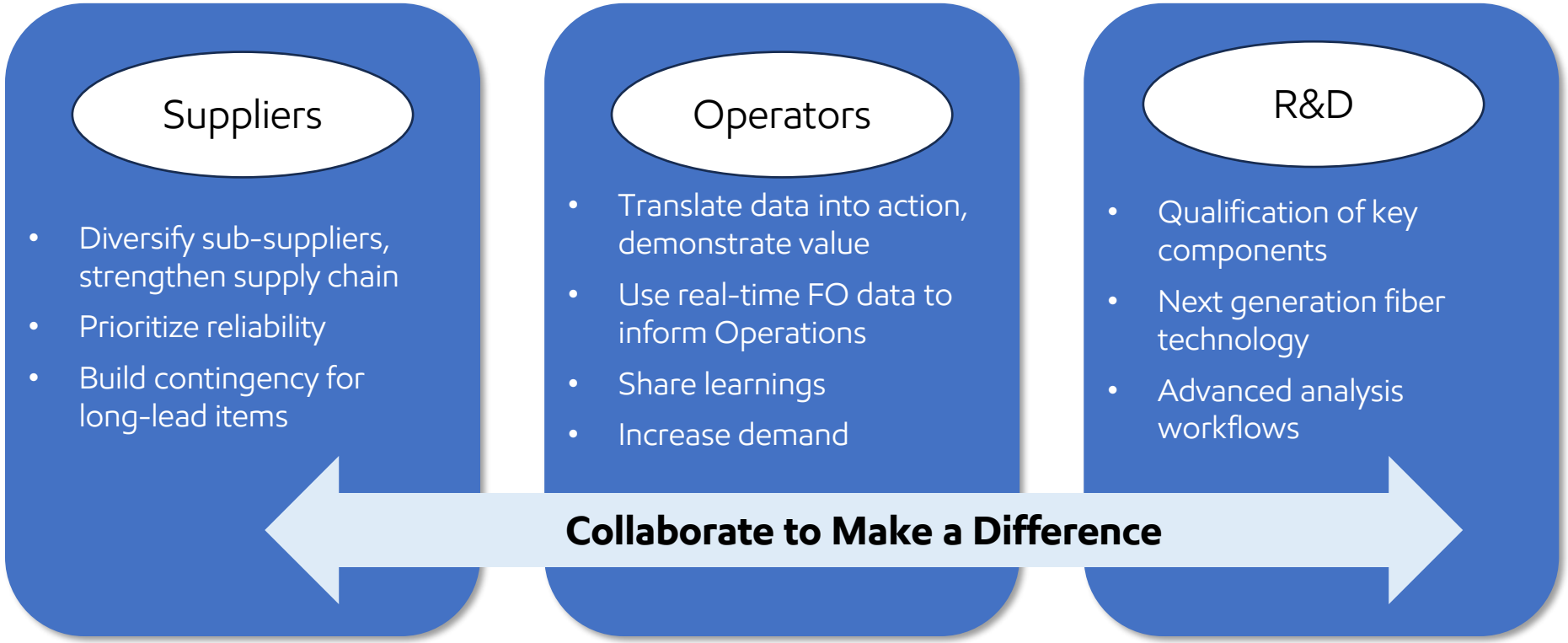
Wells not instrumented due to lack of supply or lead time

- First field was planned for 13 lower completions, but equipment qualification slipped past the rig schedule
- In 2025, we missed as many opportunities as we executed
- This performance trend is expected to continue into 2026
- Root causes are roughly split between optical tree supply and lower-completion wet-mate shortages



Call for Action

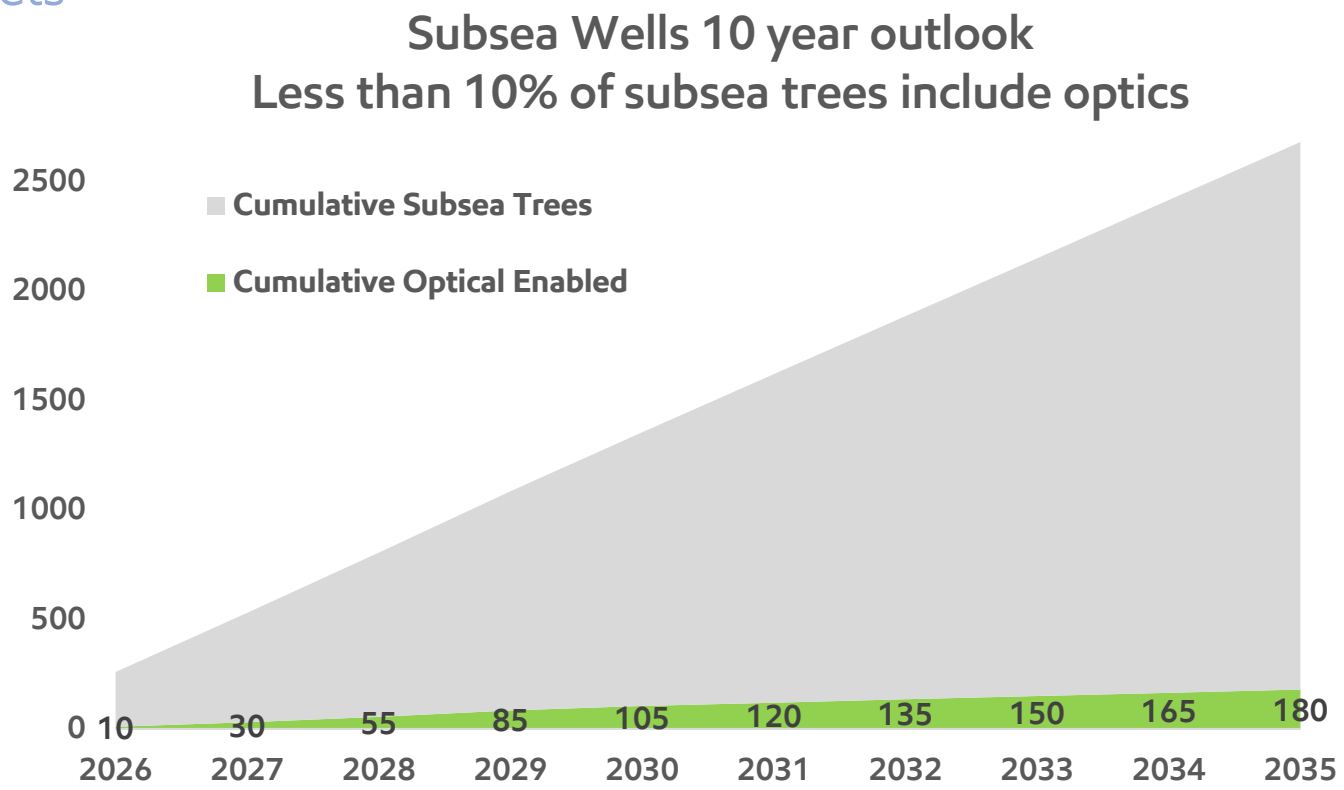
Together, we can make a difference



Looking Forward: Significant Prize Ahead Us

Unlocking the potential existing and future assets

- **Large upside potential:** Only a small share of wells use fiber today, with a big subsea wave coming
- **Expanding value:** New use cases – like asphaltene management and WAG sweep optimization – continue to grow fiber's value
- **Collaboration unlocks scale:** Common qualification standards, handling practices, and strong vendor-operator alignment are essential



Informal and unofficial forward-looking projection based upon discussions with operators, statements made at industry events, etc.

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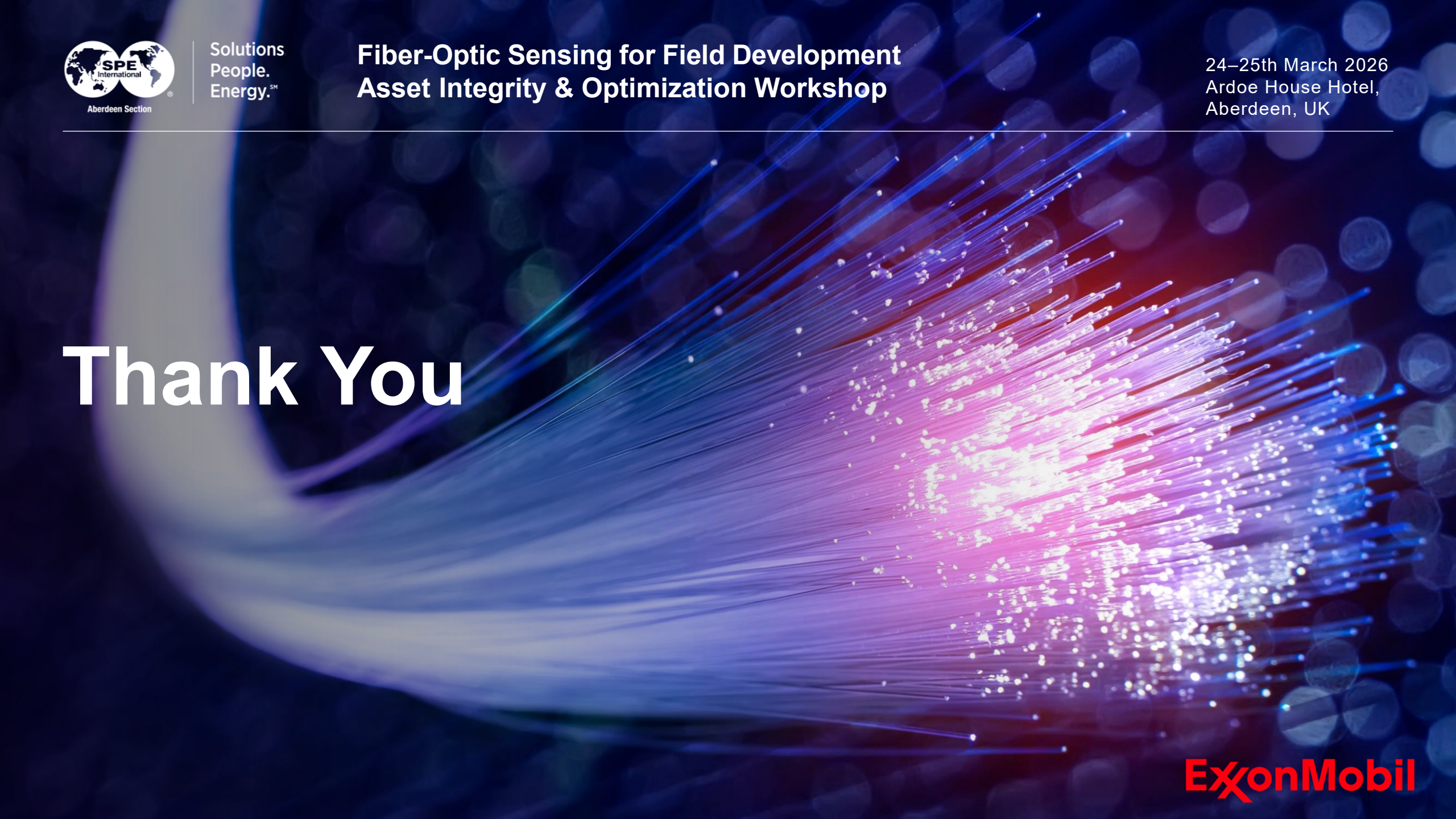

Thank You

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