

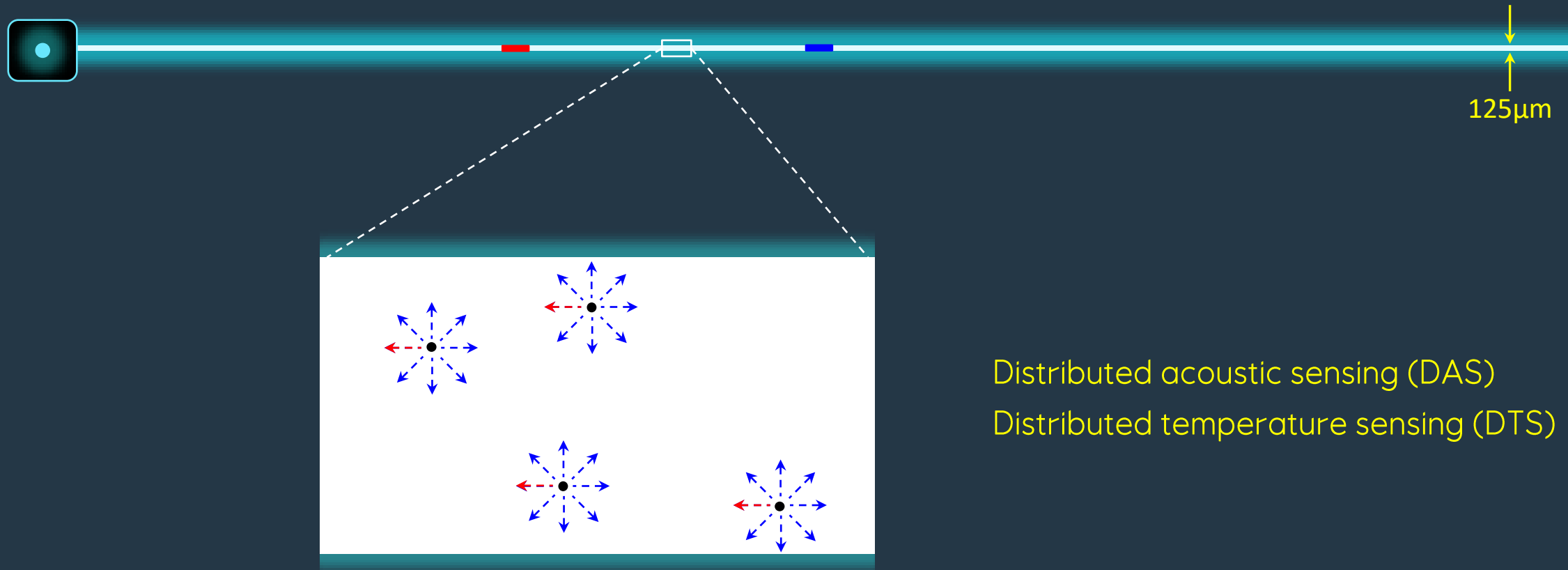
Let there be light!

An enlightening story of distributed fiber optic sensing

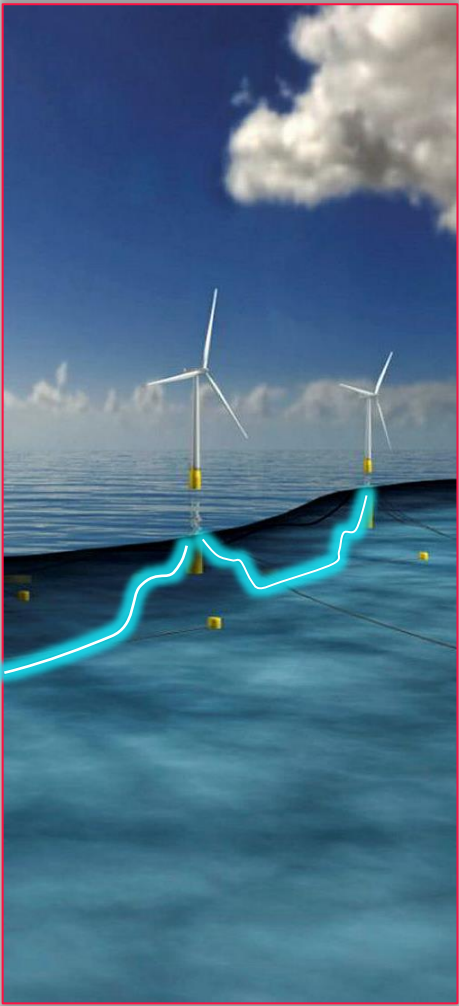
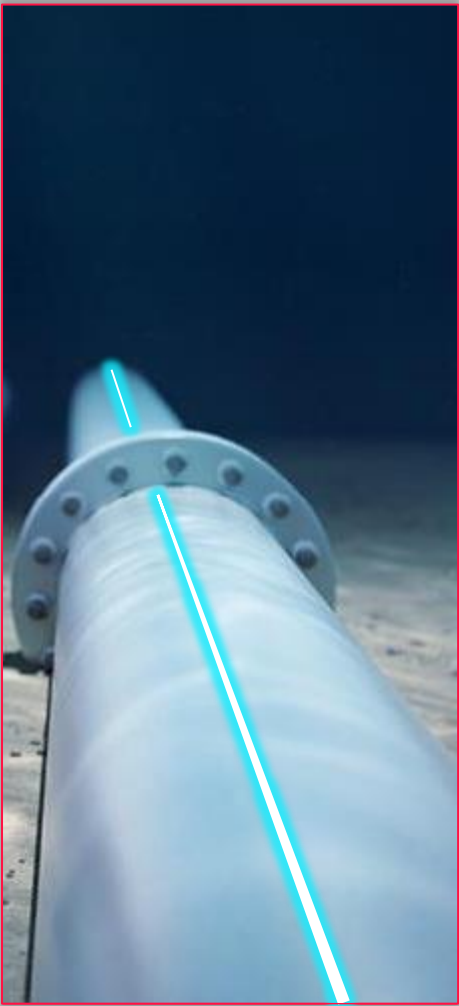
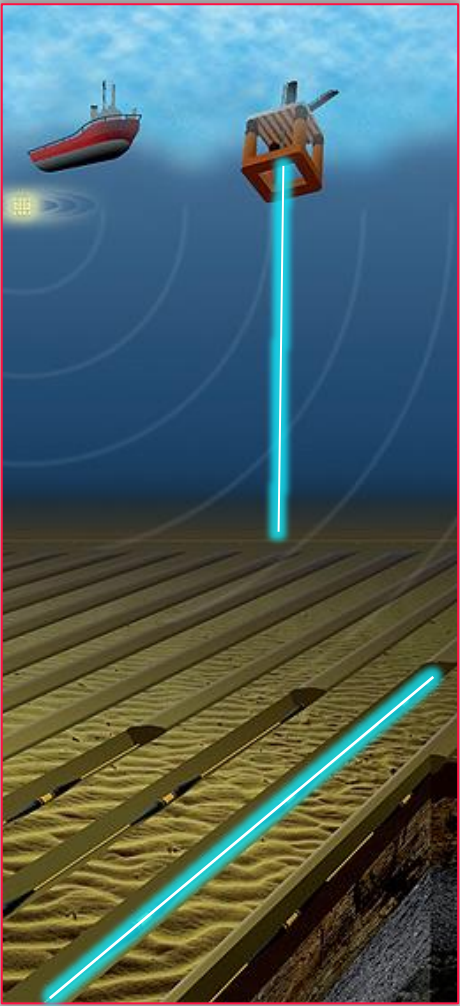
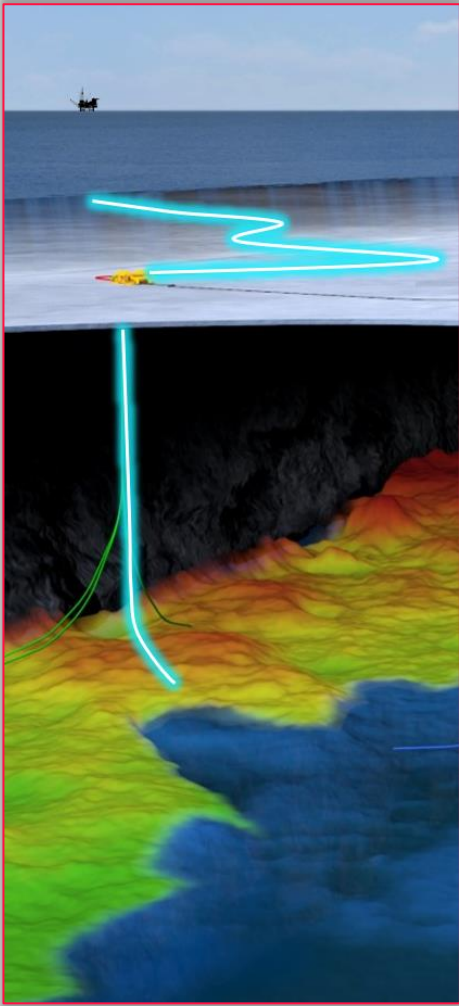
Richard Tøndel, Equinor

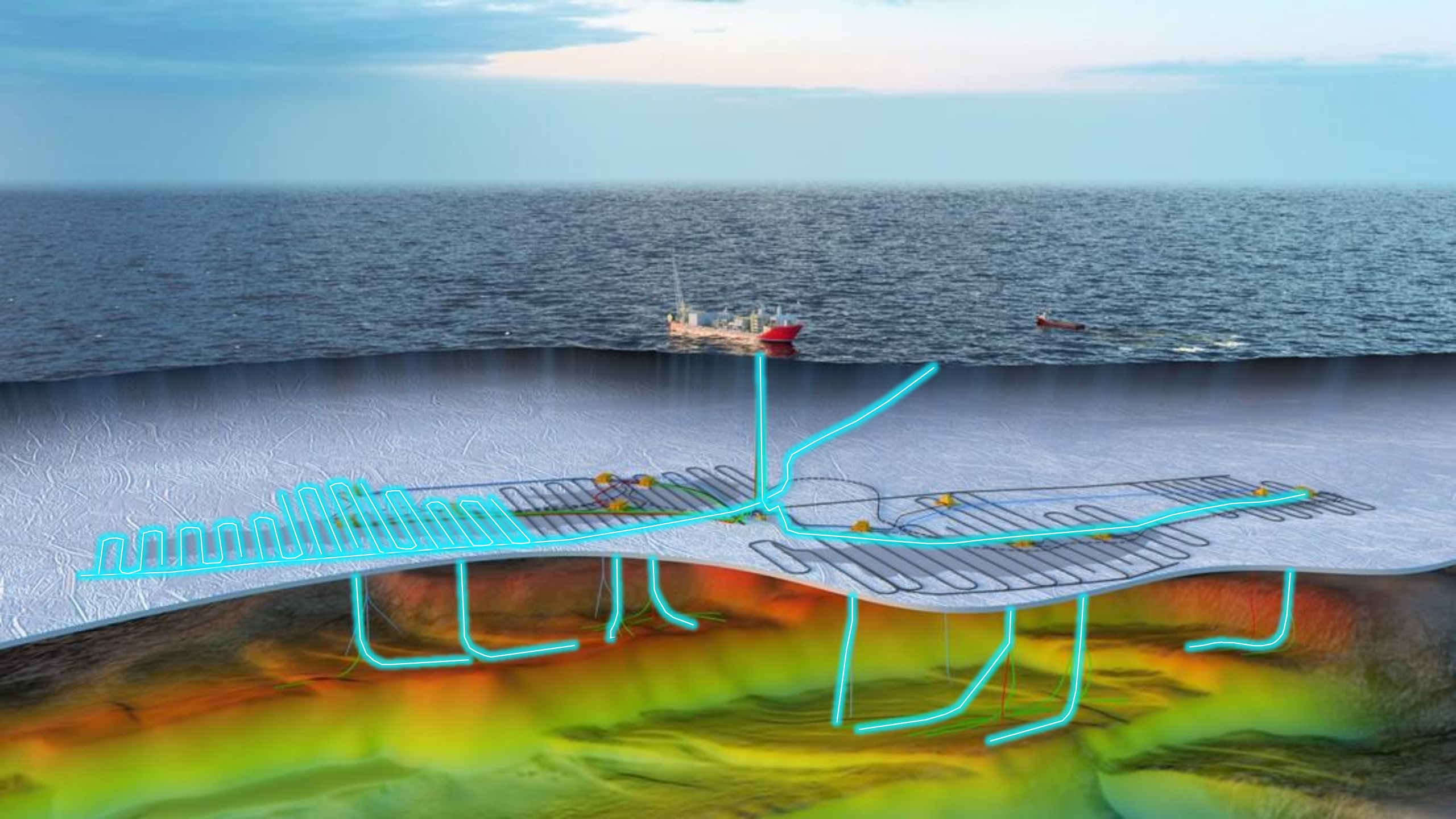
Sokkeldirektoratets Teknologidag, 6. juni 2024

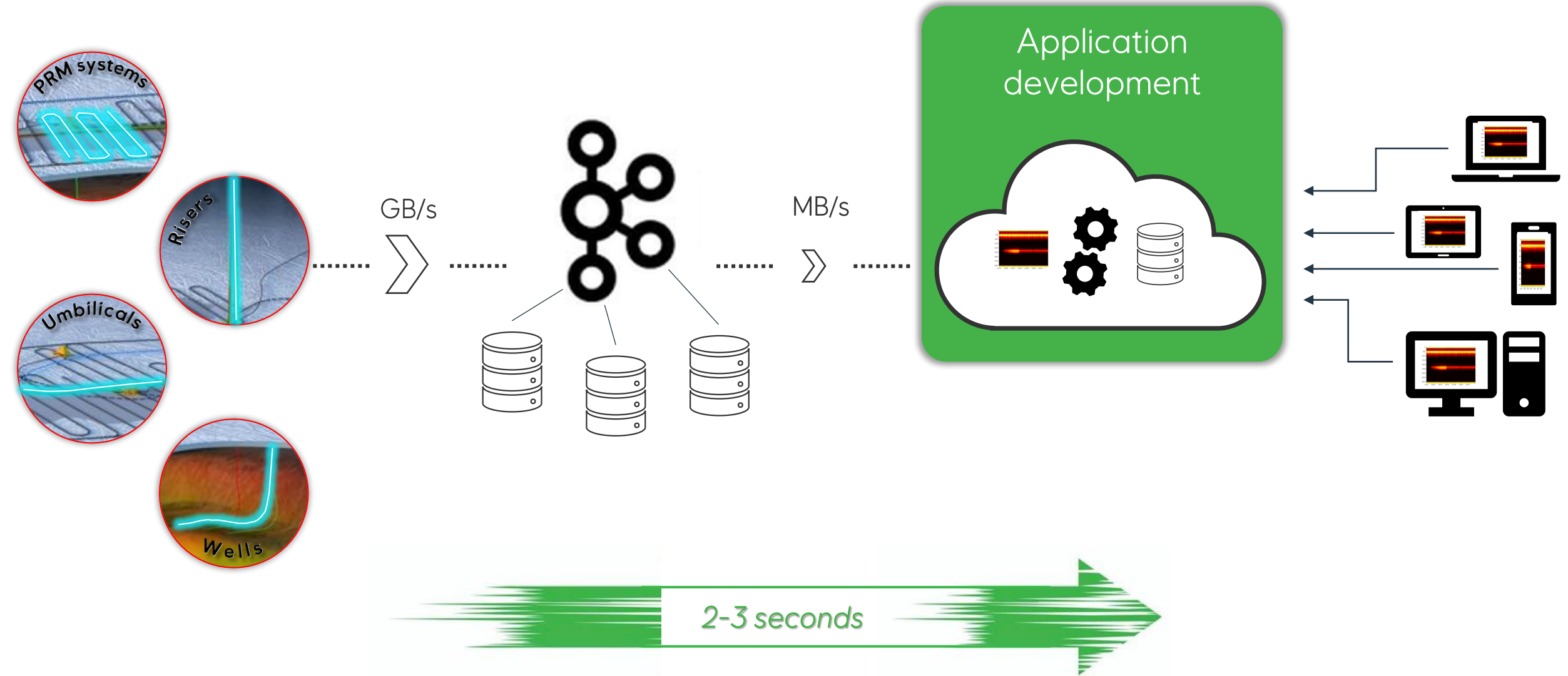
Distributed fiber optic sensing

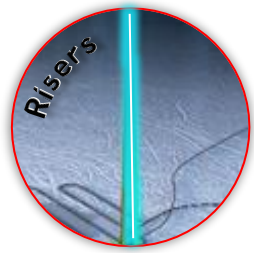


A variety of applications



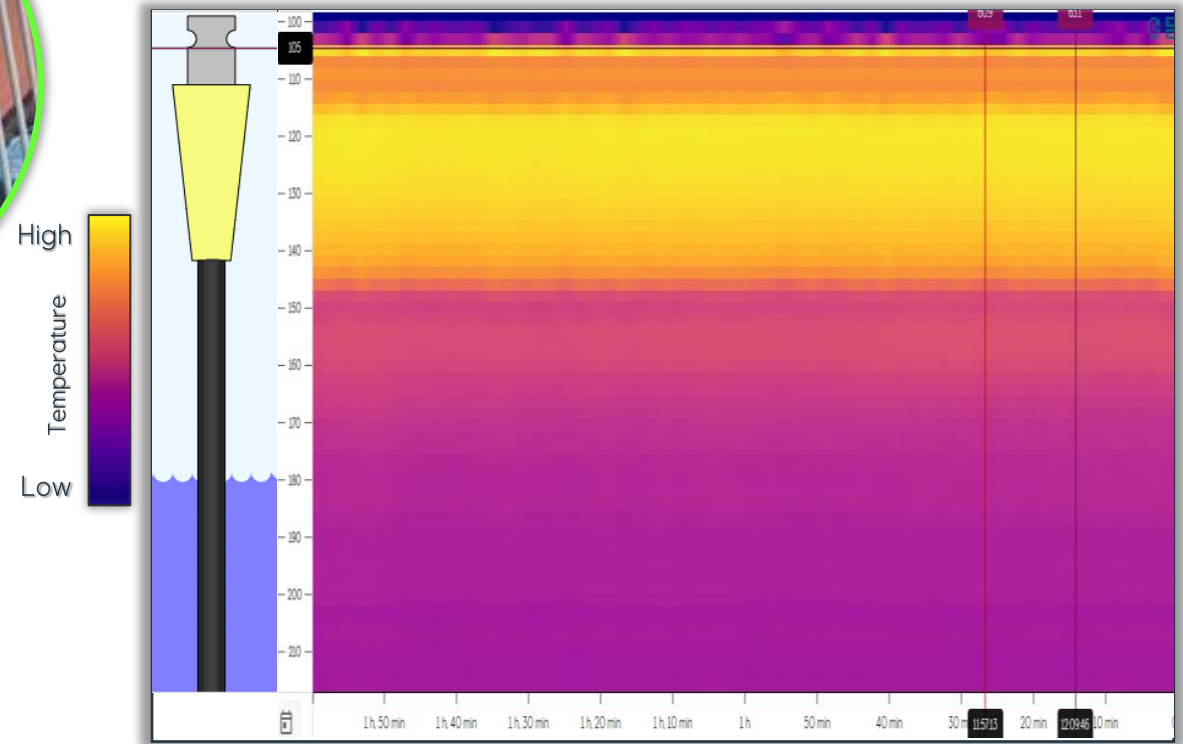
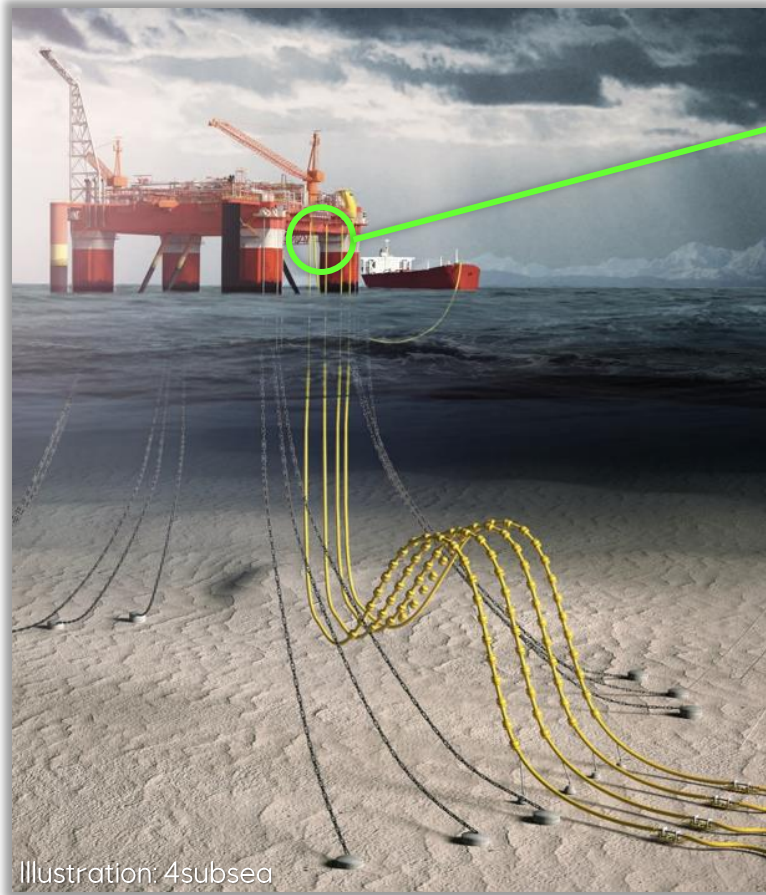




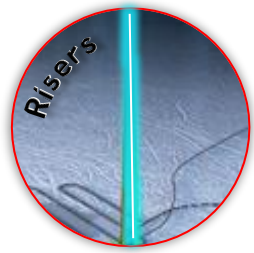


DYNAMIC RISER ANCILLARY MONITORING

EXAMPLES

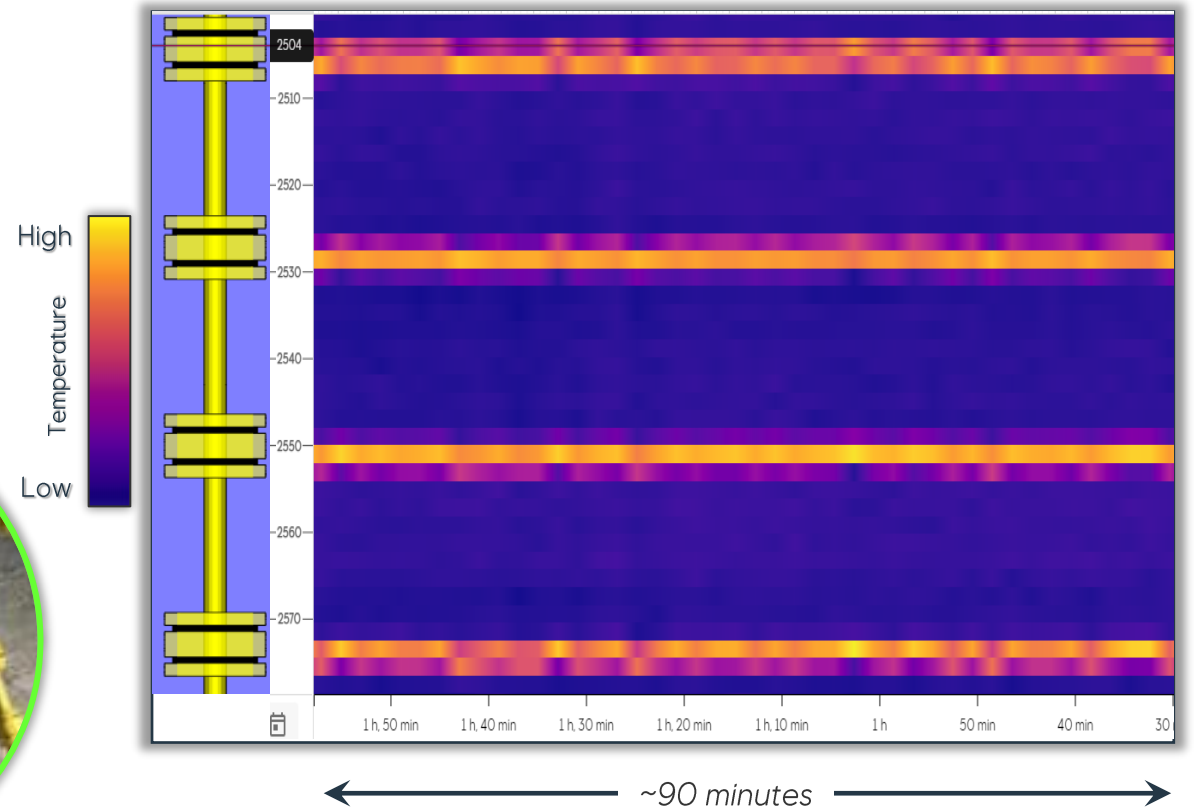
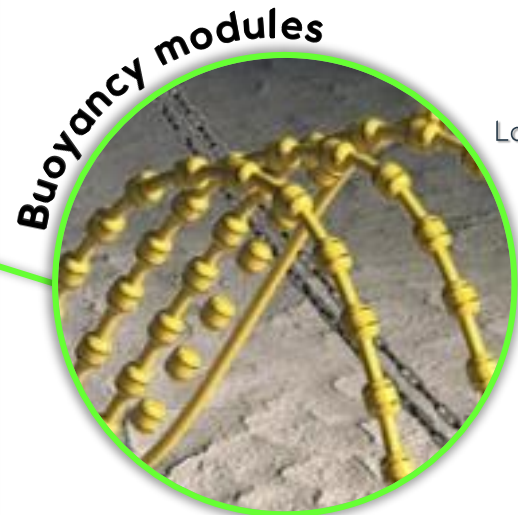
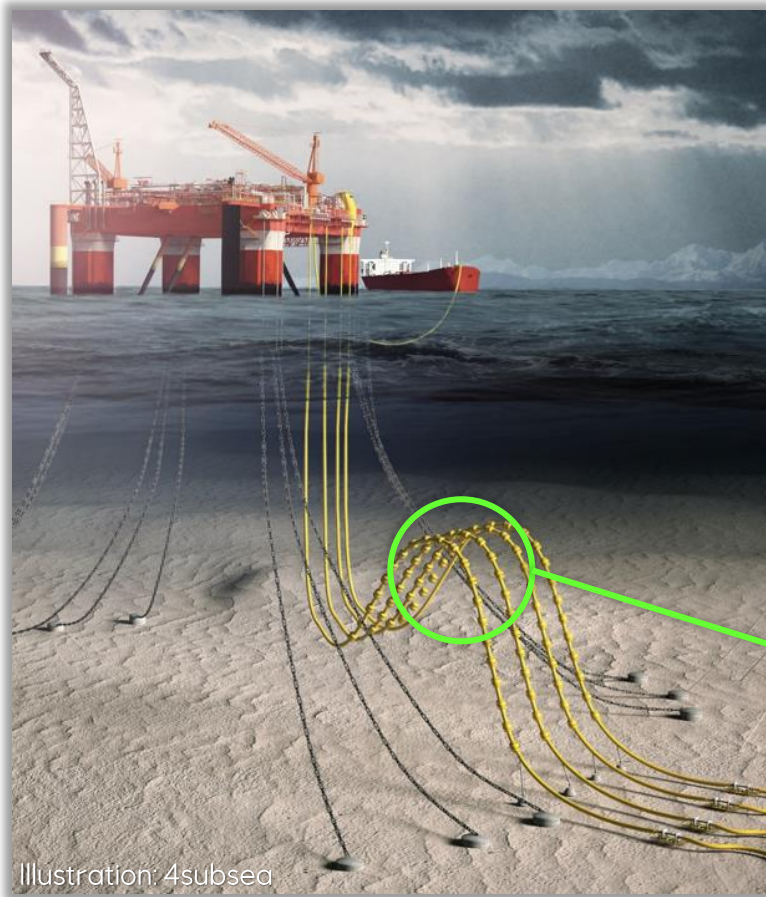


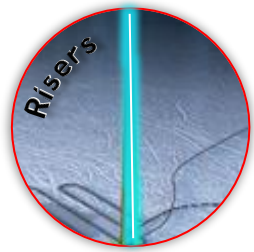
← ~2 hours →



DYNAMIC RISER ANCILLARY MONITORING

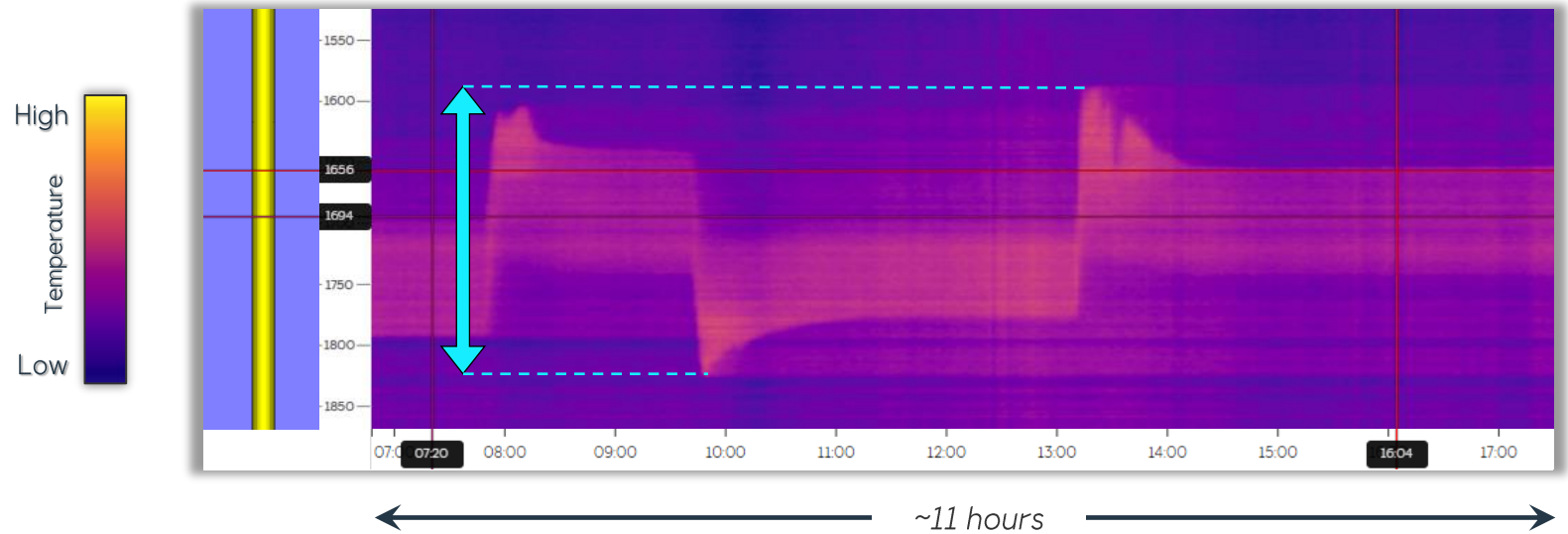
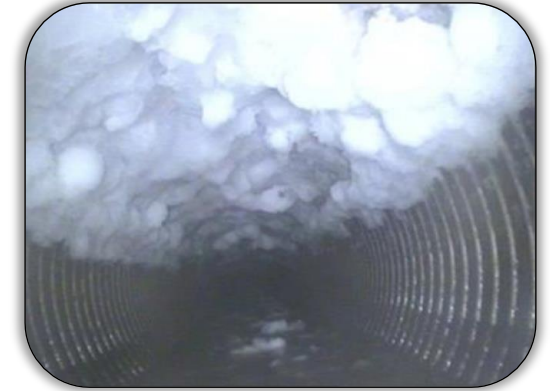
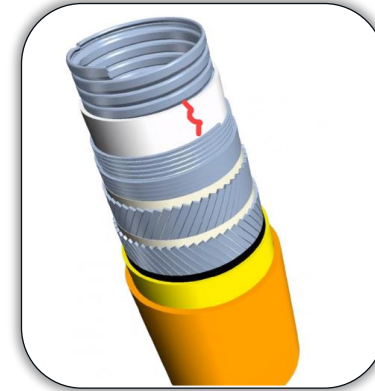
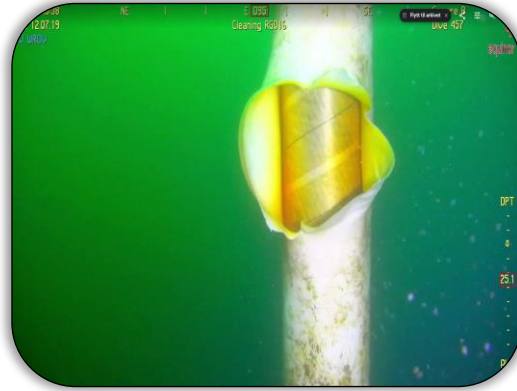
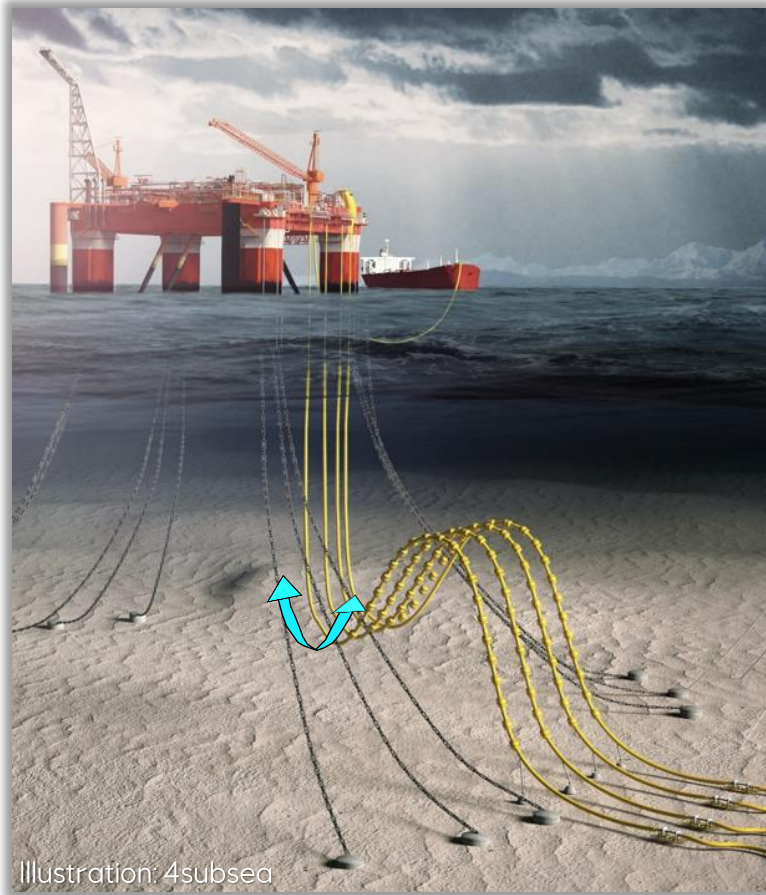
EXAMPLES



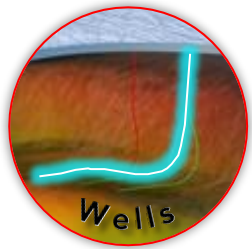


DYNAMIC RISER INTEGRITY MONITORING

EXAMPLES

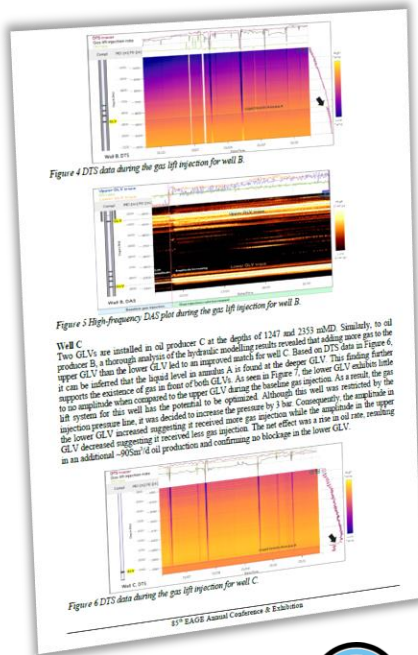


#4

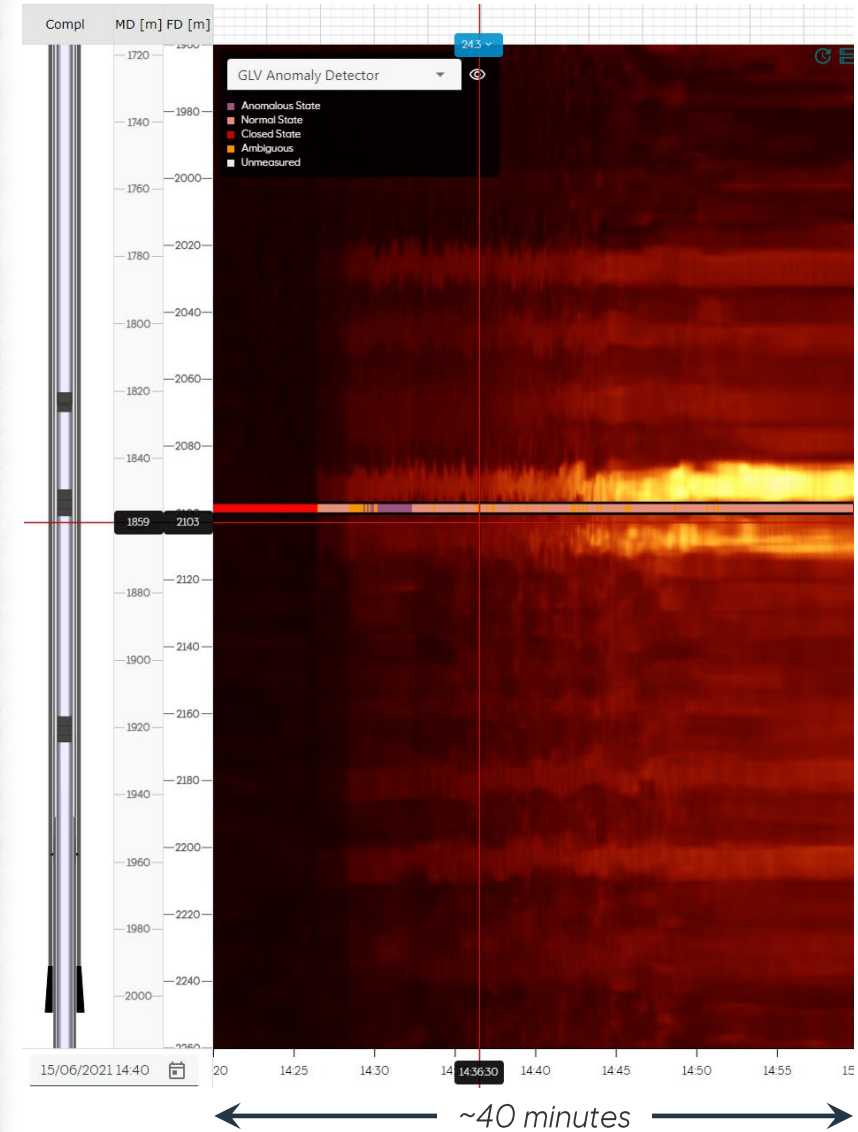
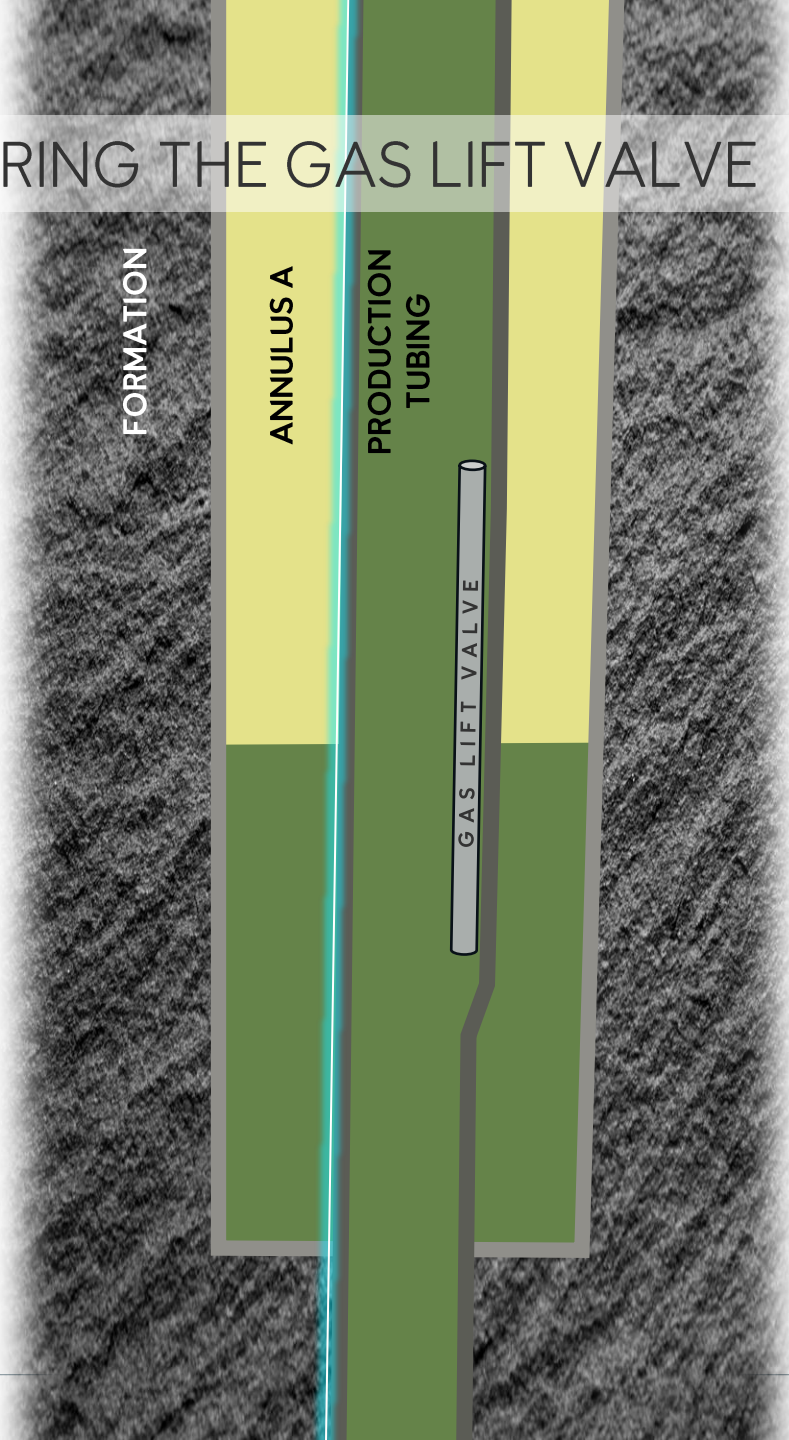


MONITORING THE GAS LIFT VALVE

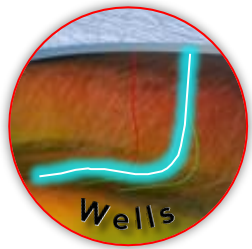
EXAMPLES



«Gas Lift Injection Optimization at Martin Linge using Distributed Fiber Optic Technology»

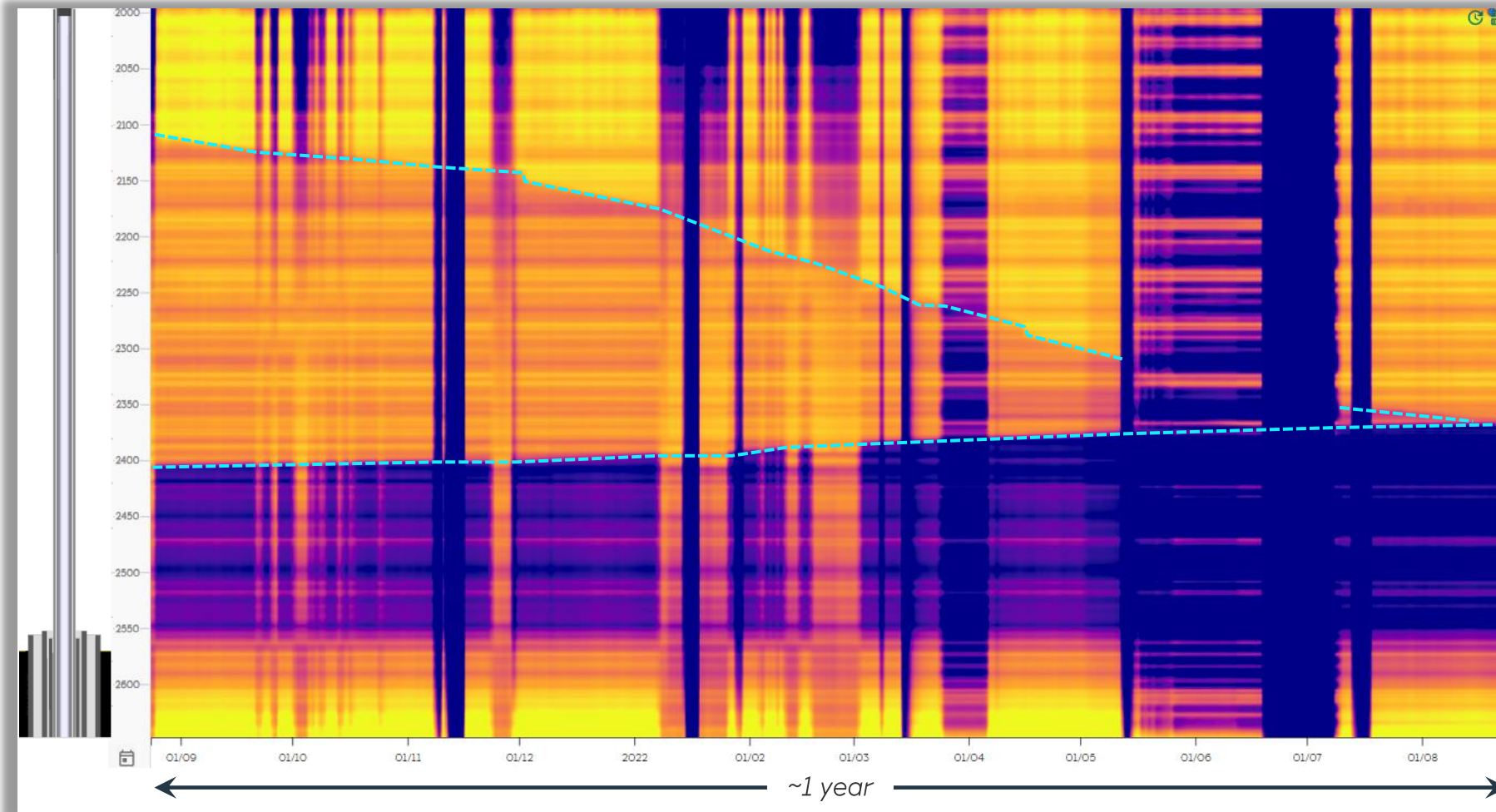


#5



ANNULI LIQUID LEVEL TRACKING

EXAMPLES



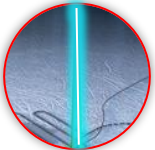
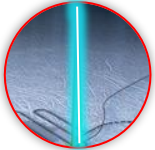



SPE Journal 29 (2024)

Kjetil E. Haavik

Annuli Liquid-Level
Surveillance Using
Distributed Fiber-
Optic Sensing Data



Value creation

			Increased production	Increased regularity	Reduced need for inspections	Reduced need for repairs	Improved safety
#1		DYNAMIC RISER ANCHILLARY MONITORING		✓	✓	✓	✓
#2		DYNAMIC RISER INTEGRITY MONITORING		✓	✓	✓	✓
#3		CONTINUOUS PRODUCTION PROFILING	✓				
#4		MONITORING THE GAS LIFT VALVE	✓	✓	✓	✓	✓
#5		ANNULI LIQUID LEVEL TRACKING		✓	✓	✓	✓

Challenges

HARDWARE



Downhole connections
 Subsea well head connections
 Installation routines
 Long offset connections

TIME & TIMING



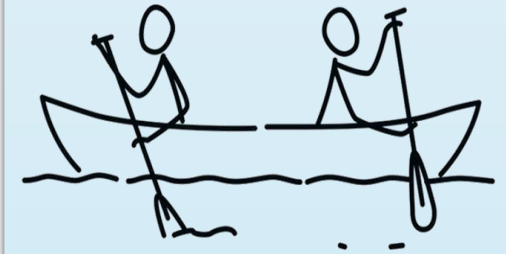
Rig time
 Ask the right questions at the right time
 Optical budget
 Data infrastructure

ORGANIZATION

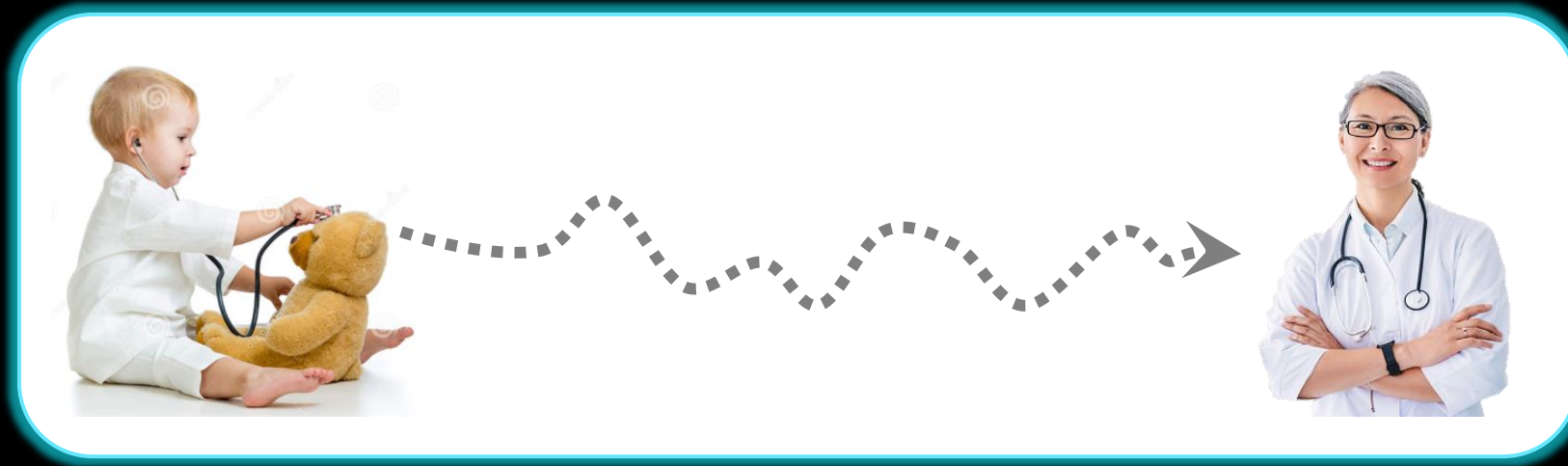


Technology ownership
 Multiple interfaces
 Multiple stakeholders
 Real time support
"Complex technology in impatient times"

CONFLICTING KPI's



Installation vs. revenue
 Lifetime perspective
 Reactive vs. predictive
 HSE value quantification



*"...there is so much more work required to learn what is possible.
At this point, the few people with access to this data are like
new medical students using a stethoscope, wondering how
those sounds are related to the patient's health"*

Gustavo A. Ugueto, Shell (2021)

Acknowledgements

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Let there be light! An enlightening story of distributed fiber optic sensing

Richard Tøndel, Equinor

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