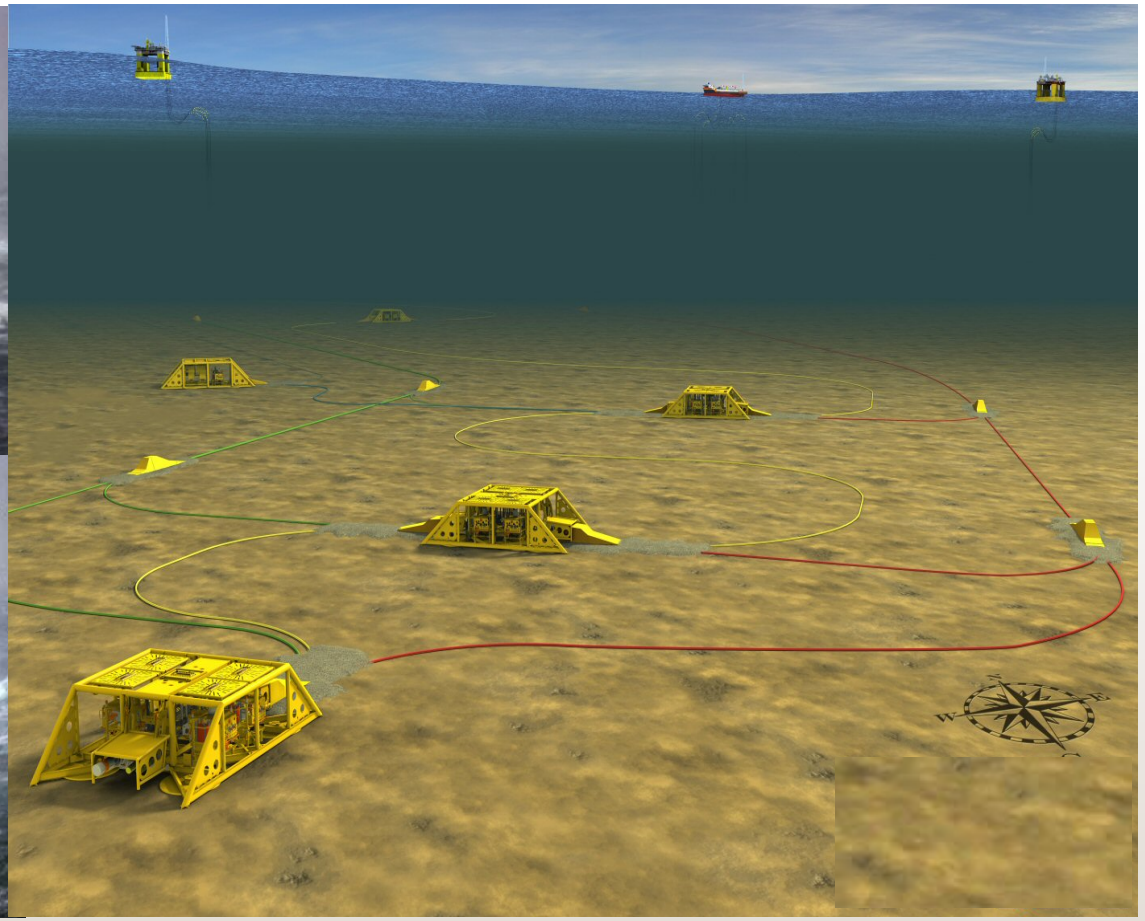


Hvor står vi? Hvor går vi?

Roald Sirevaag, Subsea Chief Engineer, Technology & New Energy

StatoilHydro

Presentasjons innhold

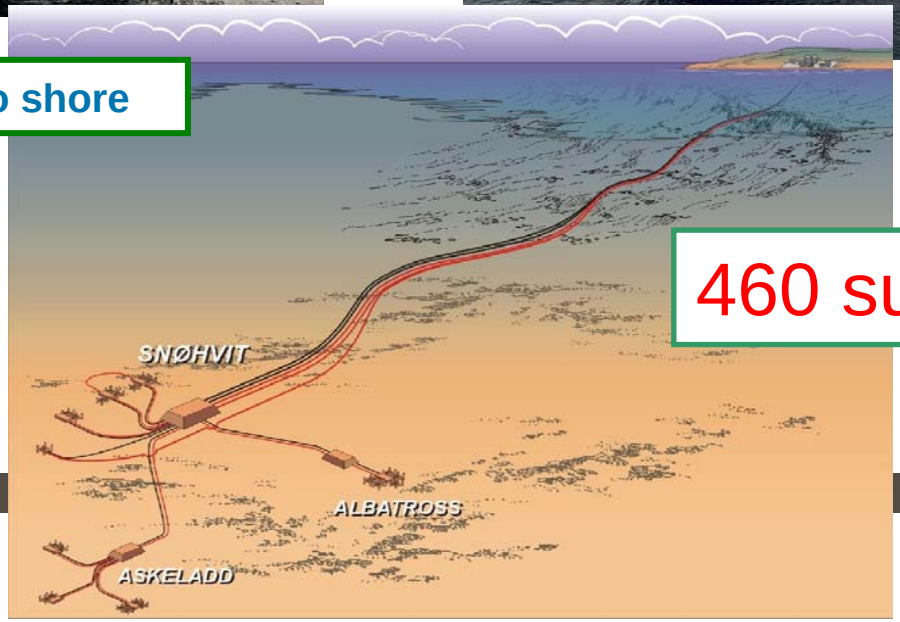
1. Hvor står vi?
2. Hvor går vi?
    1. Vertikal integrasjon
    2. Horisontal integrasjon
    3. Subsea prosessering
    4. Intervensjon

Development solutions & trends

1. Fixed platforms

2. Floating production systems

3. Subsea to shore



460 subsea wells

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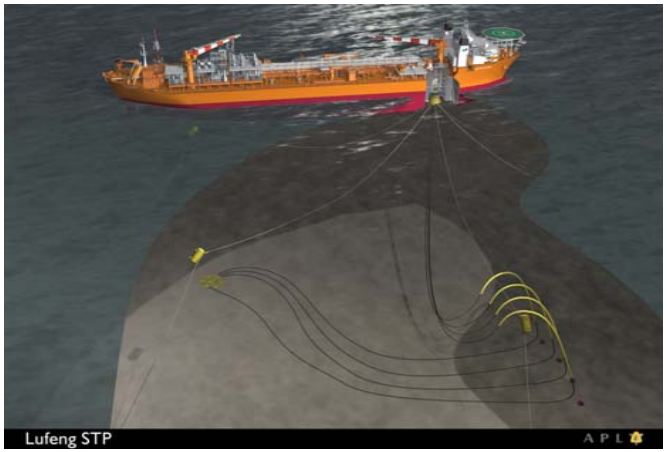
Global leader in Subsea Processing

12 years history



1986
Gullfaks/Oseberg
First subsea wells

1997
Lufeng
Subsea pumps

2000
Troll
Subsea water removal and injection

2002
Statfjord sat.
Electric chokes

2005
Norne
Electric manifold valves

2007
Tordis
Subsea water and sand removal & injection, oil & gas boosting

Fit for purpose, state-of-the-art separators, pumps, control & power systems

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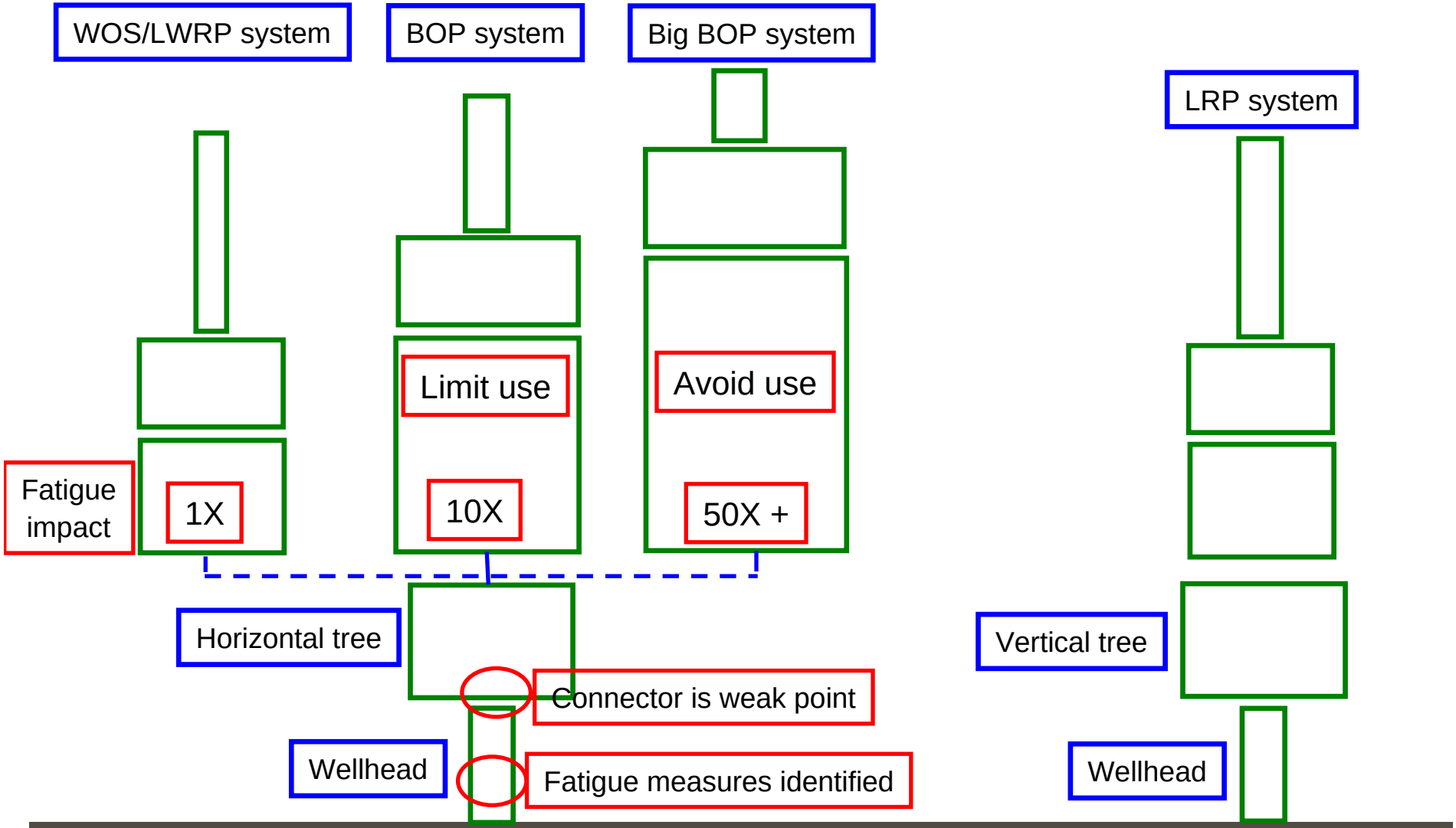
Challenge/Solution 1: Wellhead and XT fatigue – 350meters NCS



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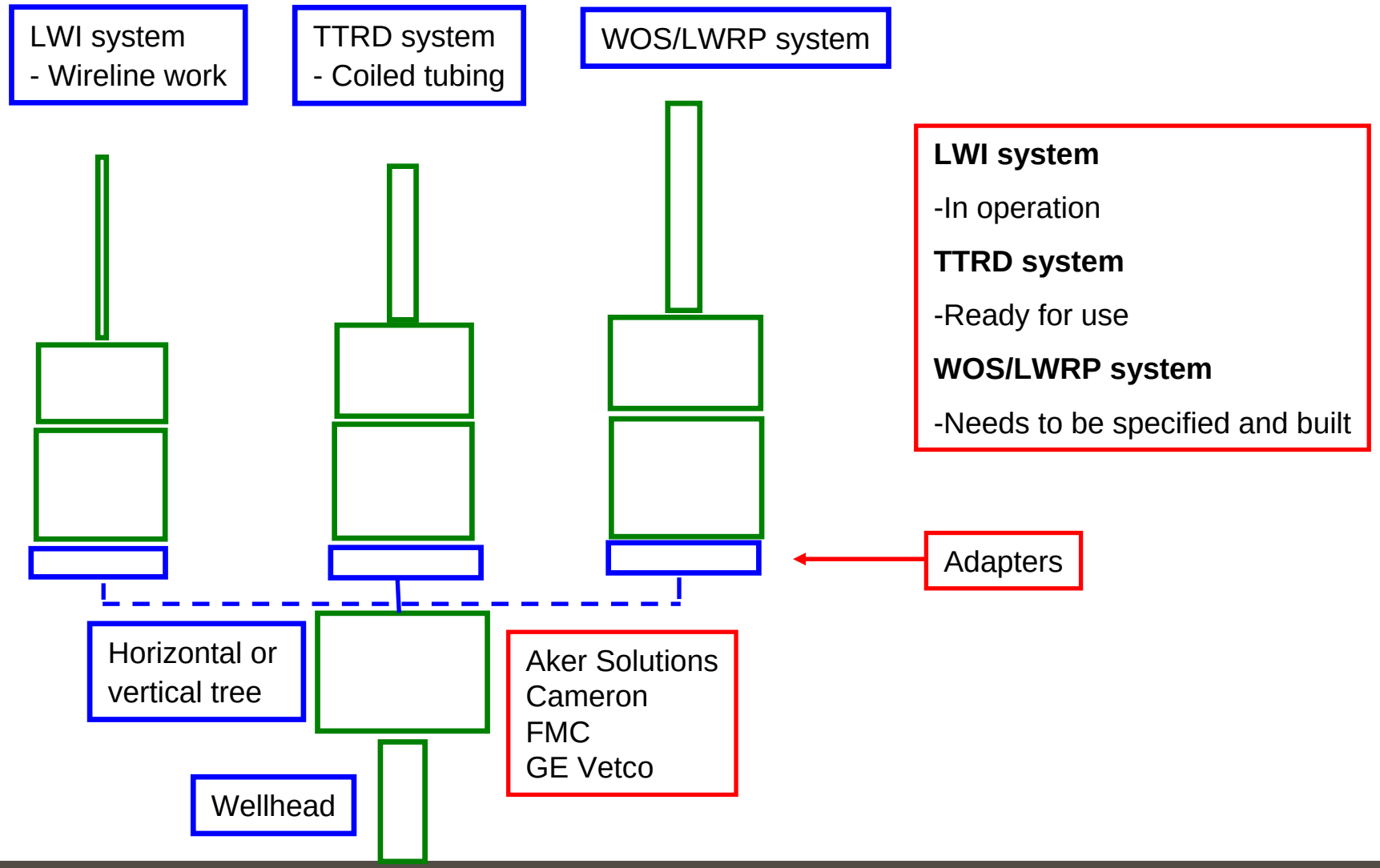
Challenge/solution 1 – added value: New generation LRP



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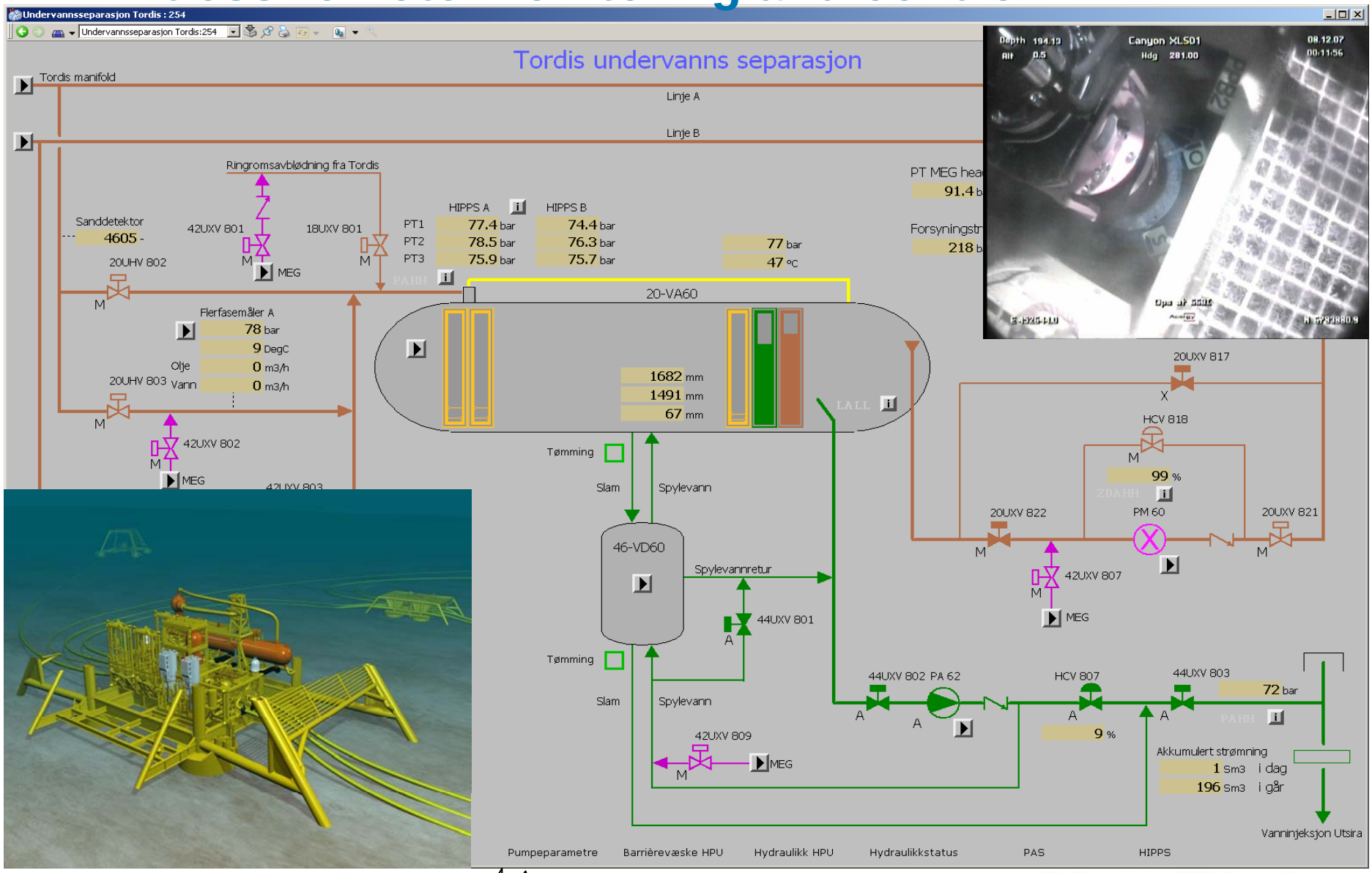
Challenge / Solution 2: Horizontal integration Plug and Play – IO & IOR

- -5 / -6 Status / Need:
  - Subsea Instrumentation Interface Standardisation (SIIS) for subsea sensors
    - 4-20 mA
    - Ethernet
    - CanBus
  - Intelligent Well Interface Standardisation (IWIS) for downhole systems
  - SEAFOM for fibreoptics

Limitless remote monitoring and control



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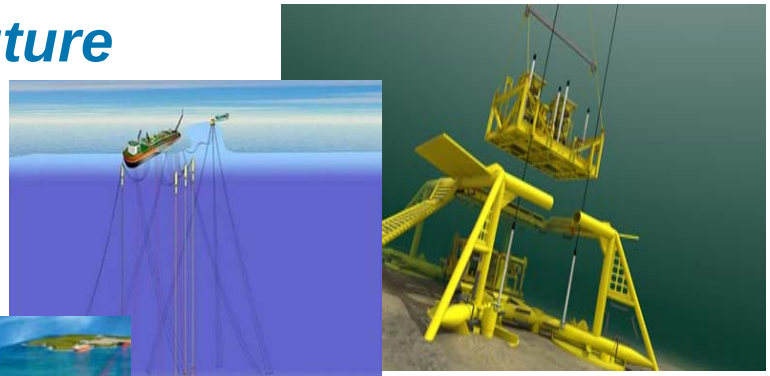
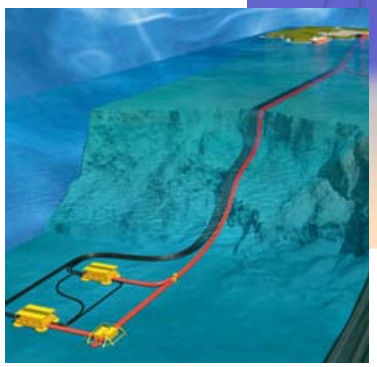
Global leader in Subsea Processing

The future





2009
Tyrihans
Raw seawater injection

2011
Åsgard
DC / FO control system pilot

2010-12
Tyrihans / Peon
Pilot / All electric field development

2013
Gullfaks
2 X 4 MW subsea compression

2014
Shallow / Deepwater
Compact separation

2014
Tucker
Deepwater high pressure oil boosting

2014
Åsgard
2 x 8.5 MW subsea compression

2015
Brazil
Deepwater heavy oil separation

2016/20
Luva
Long distance power, boosting and transport

Operational experience from Lufeng, Troll Oil, Tordis IOR, Tyrihans injection, testing at Porsgrunn and K-lab

Draft – Topics and fields will change

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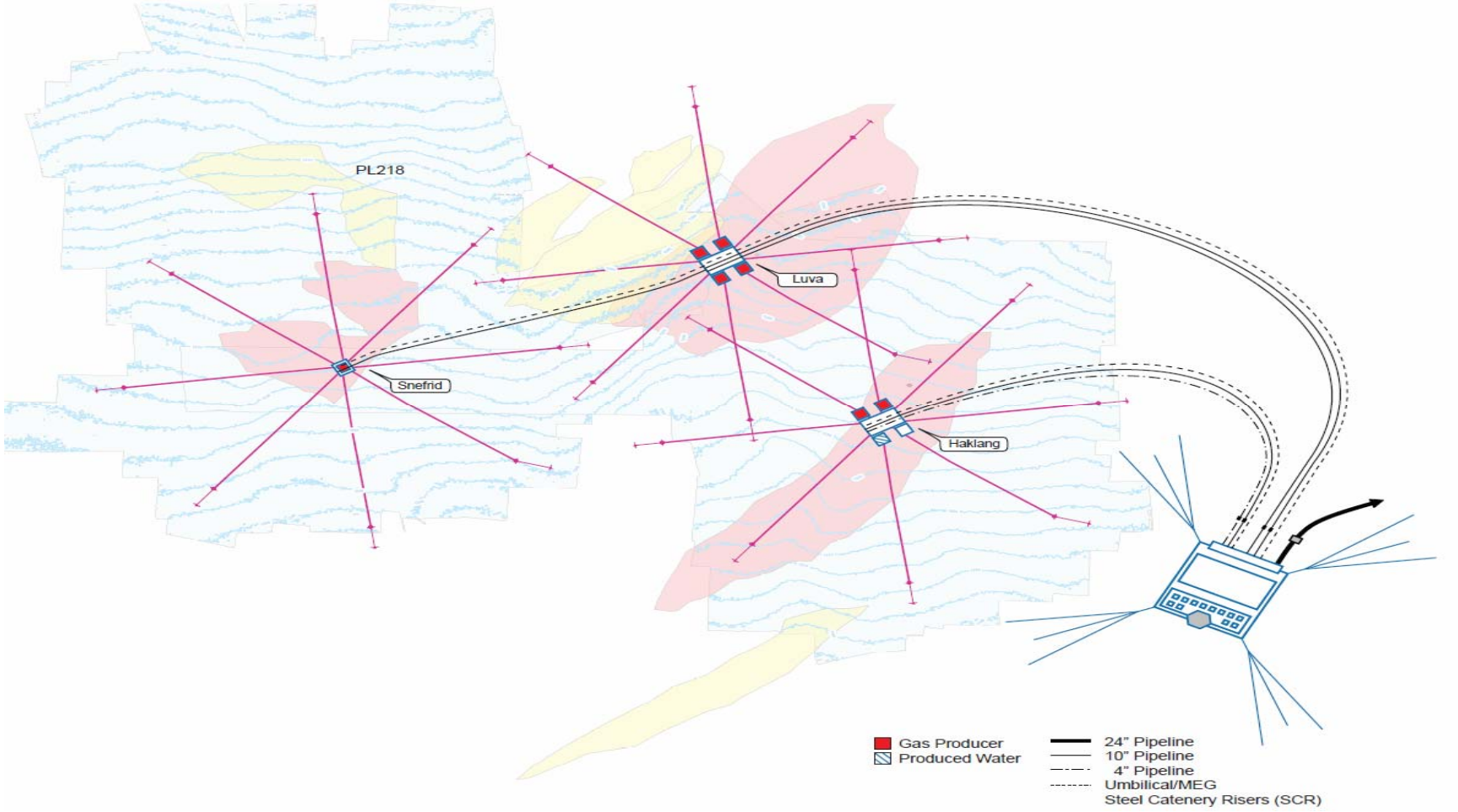
Luva – 1300m water depth – example field layout



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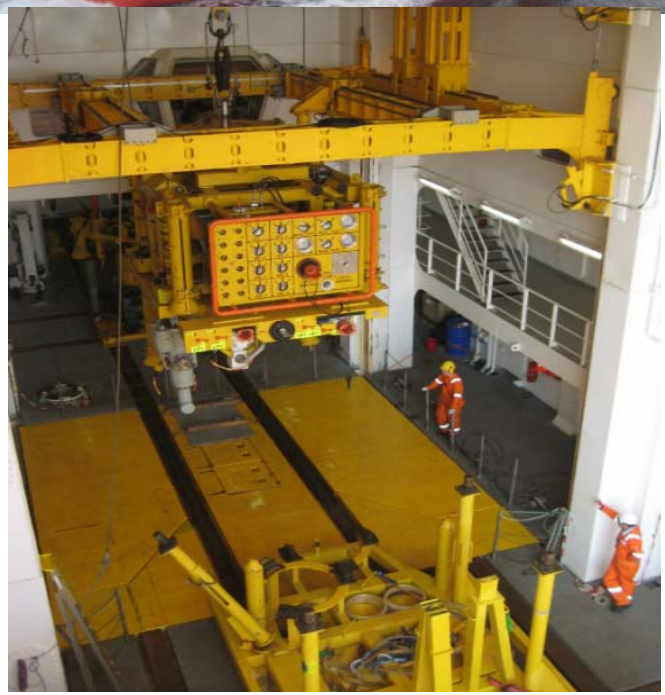
Safe and efficient field operations - enhancing production (1/3)

Efficient Inspection, Maintenance, Repair

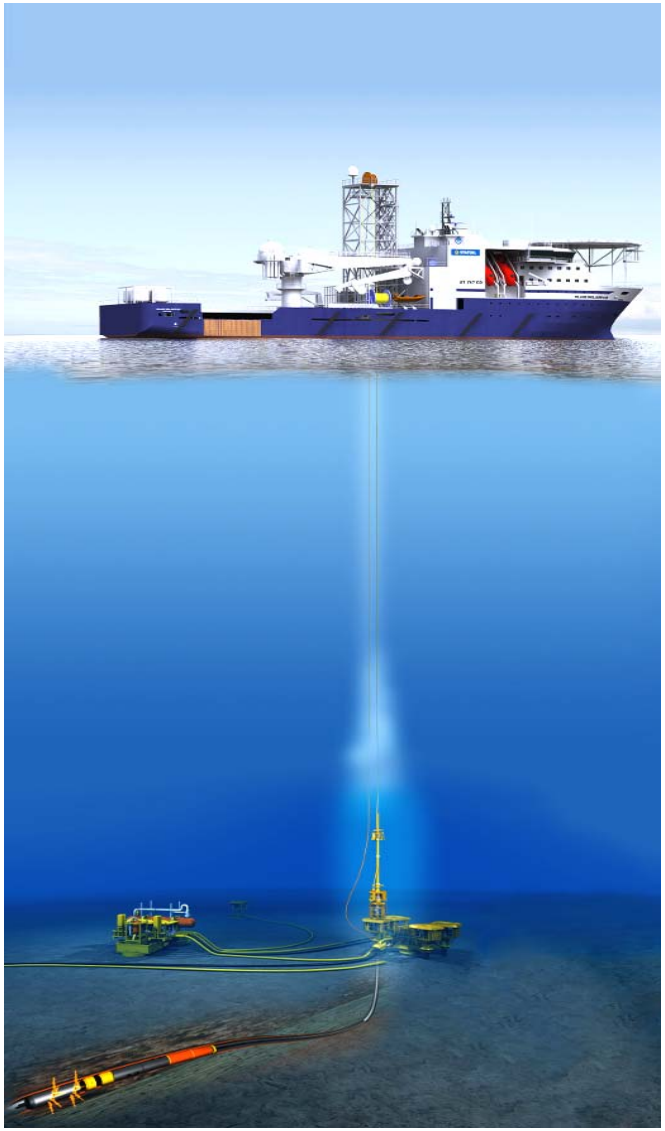


- Typical applications:
  - Choke module exchange
  - Control module exchange
  - Scale squeeze
- StatoilHydro operates 4 vessels on around the year basis
- Performs about 600 jobs on 450 wells pr. year
- New vessels operate in 5 m waves

Safe and efficient field operations - enhancing production (2/3)

Low cost subsea well intervention

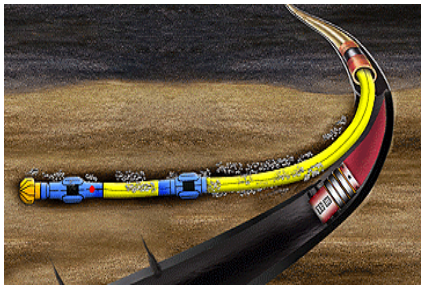
- Typical applications:
  - Data gathering (PLT)
  - Perforating short intervals
  - Zone isolation (plug/ straddle)
  - Inspection/repair (DHSV)
- 40+ LWI operations since 2003
- Island Frontier and Island Wellserver



Safe and efficient field operations - enhancing production (3/3)

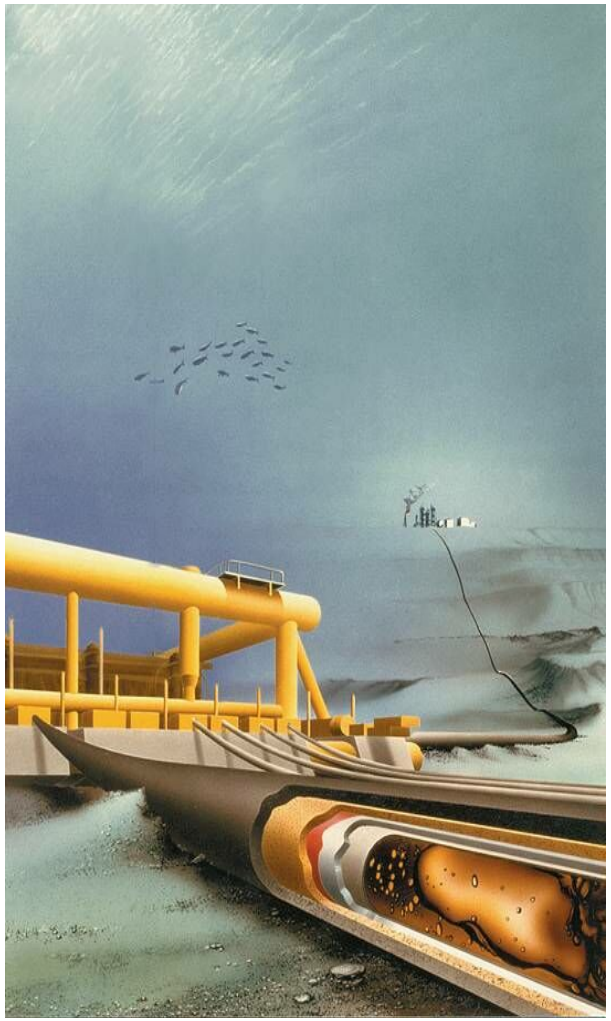
Low cost drainage points

- **Trough Tubing Rotary Drilling (TTRD)**
  Operation through existing production tubing and x-mas tree
- The alternative is conventional sidetrack after pulling production tubing and tree.
- 2 subsea TTRD operations (worlds first) with first generation system
- **New state of the art system to be used on Norne/Åsgard from Stena Don in Q2**



Closing remarks

- Implementation of new technology pays off.
- New tools and systems are being developed.
- We can together take the next steps to new depths and new horizons with higher reservoir recovery.



Roald Sirevaag
RBSI@StatoilHydro.com

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