



Remote Piloting

Connecting what's needed with what's next

Arve Iversen, ROV Operations Manager, Oceaneering
Bernt Fanghol, Sales Director Offshore, Telenor Maritime
Trond Eriksen, Principal Engineer Subsea Technology, Statoil

FFU Seminar 2017





LEAN in Statoil

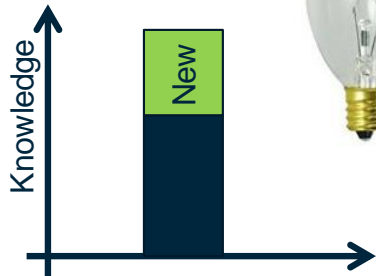
Simplification is a vital part of our agenda. It is not about cutting costs by doing less. It means getting to the core and doing more with less. LEAN is a concept and a way of working that more at Statoil are getting to know. It is a philosophy of continuous improvement, through involvement and collaboration. And it applies to all of us. –**Eldar Sætre President and CEO, Statoil**

Innovation

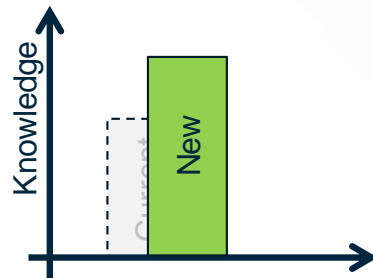
Incremental

VS.

Radical

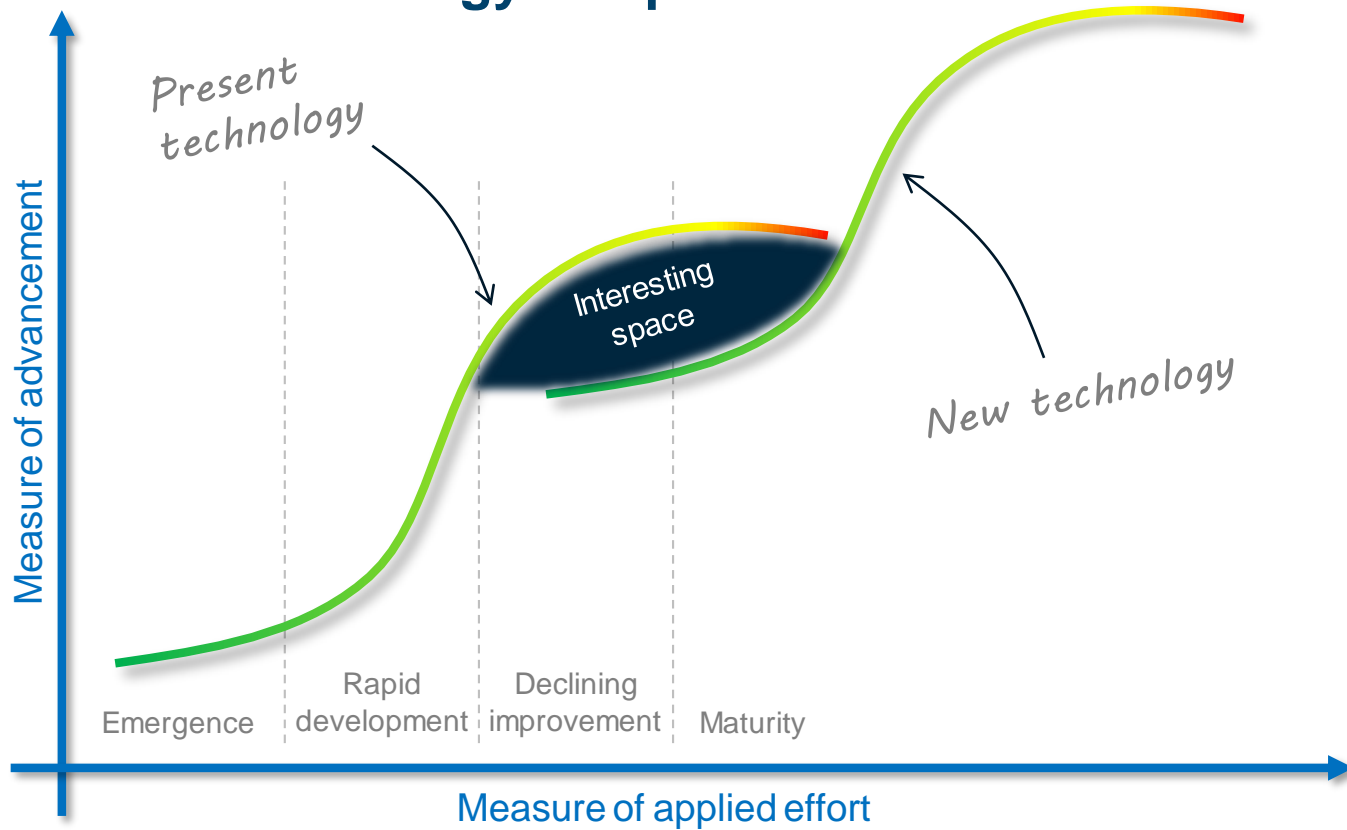


Builds on current knowledge and competence



Makes current knowledge and competence obsolete

“S”-curve for Technology Adaption

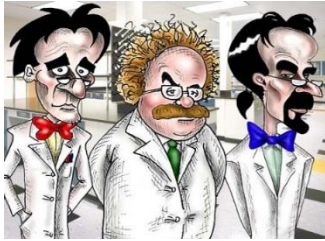


Incremental vs. radical innovation

and the difference in skill set needed to progress



+



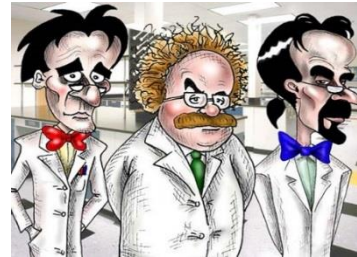
Experts on paraffin lamps



What if you showed them a light bulb . .



The challenge. . .



Experts on ROV and telecom



OCEANEERING[®]

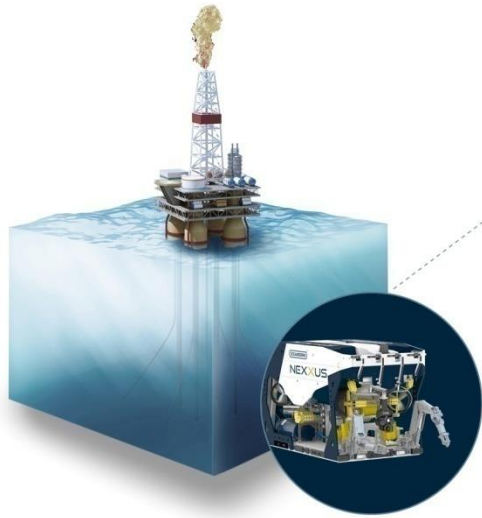


The Challenge

- New Reality
- What now?



Remote Piloting



Remote Piloting - Building Blocks



Mission Support Center

Onshore control facility bringing you full functionality and control of the ROV with associated tooling ashore.



Automated Control Technology

Enhanced by automated ROV and tooling control technology offshore.



Real-Time Communication Systems

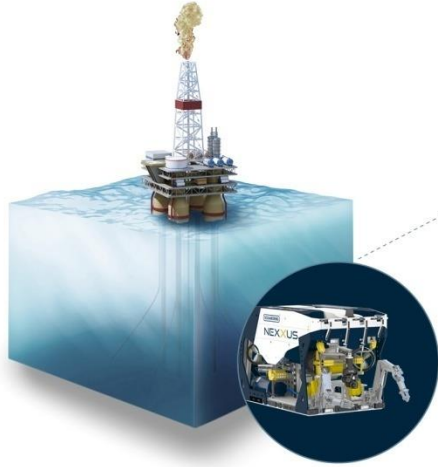
Low latency, high speed broadband data communication from offshore closes the gap to your subsea operations.

The mobile industry has driven radical changes in how we work, collaborate and communicate onshore



- The offshore O&G society has been left behind
 - Hindering innovation
 - Losing productivity gain
- Telenor Maritime is the mobile operator at sea – 4G on NCS
 - Removes the “digital divide”
 - Supports innovation
 - Enables smarter ways of working

Benefits



Cost Reduction

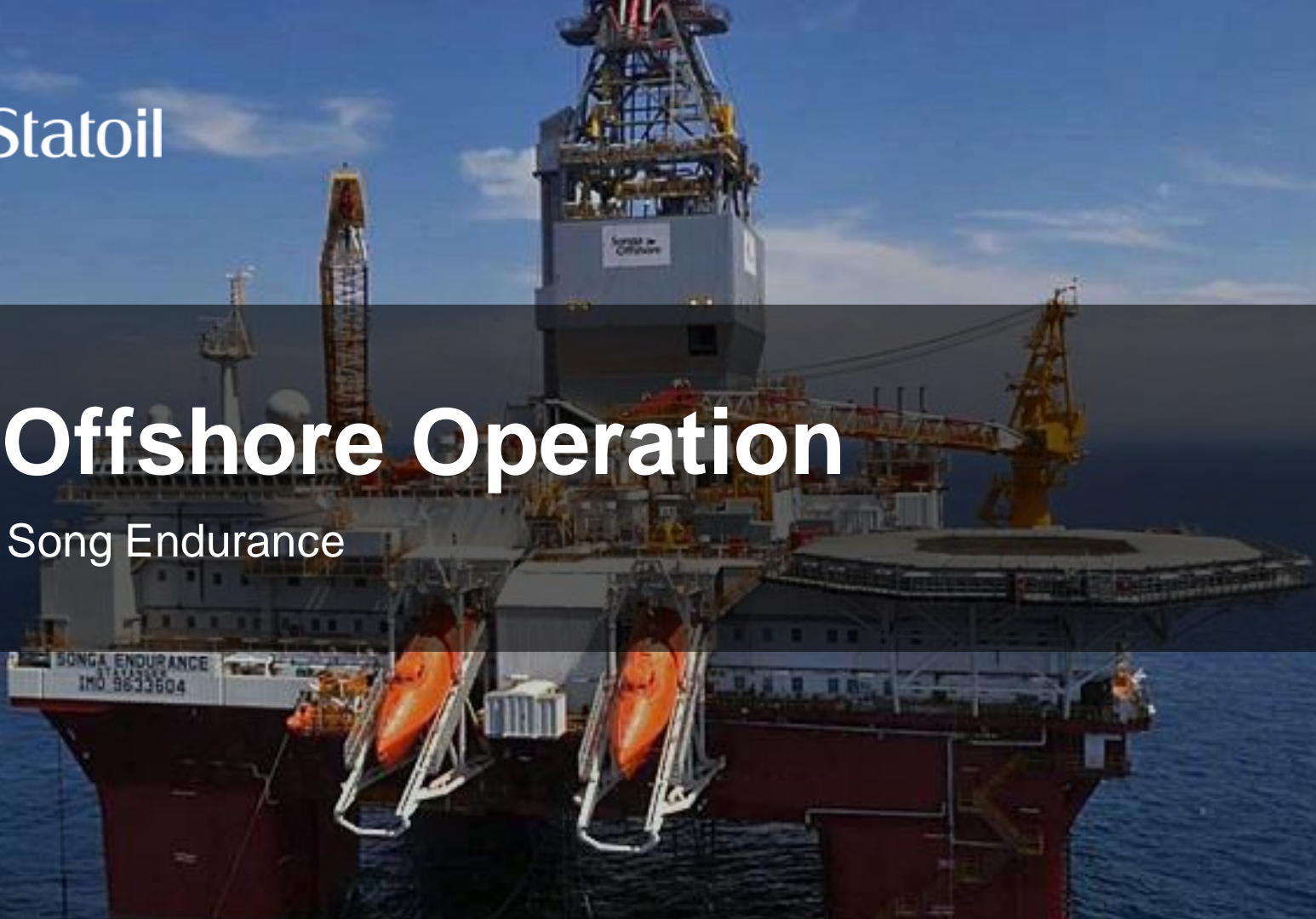
- Reduced **CAPEX** Specialist **SO Available when needed**
- Reduced **ROV manning / CO2 footprint**
 - More **operational flexibility**
- Reduced **travel logistics cost**
 - Improved **incident management**
- Less personnel **standby time offshore**



Statoil

Offshore Operation

Songa Endurance





Work ROV System

Magnum - 183





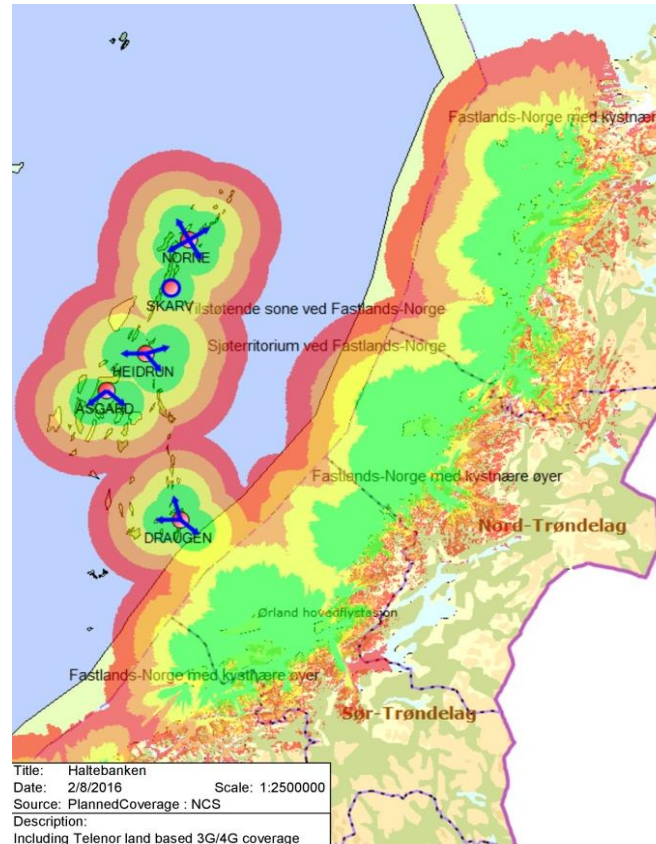
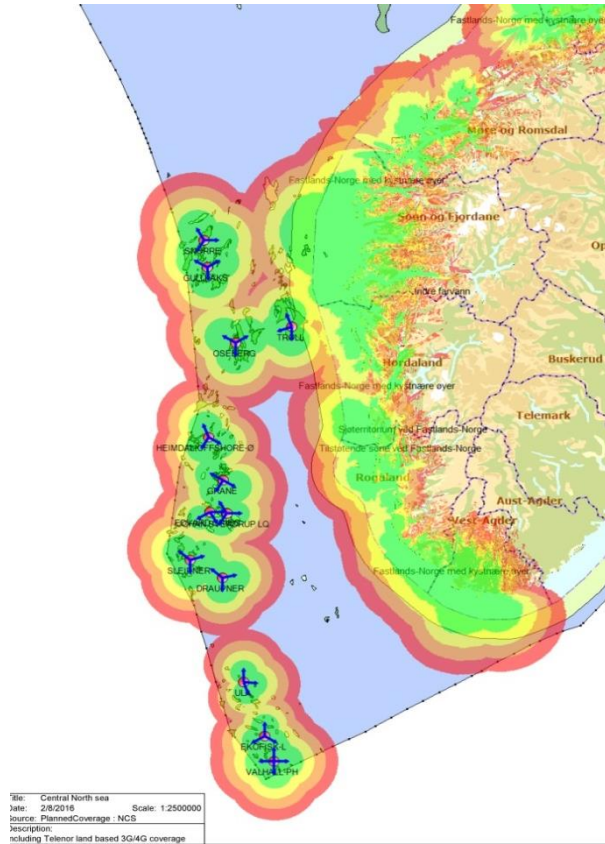
telenor | maritime

Broadband Data Connection

Telenor Offshore Public 4G LTE



Combined coverage on NCS and shore based mobile broadband



So.....Will the Demo fly?



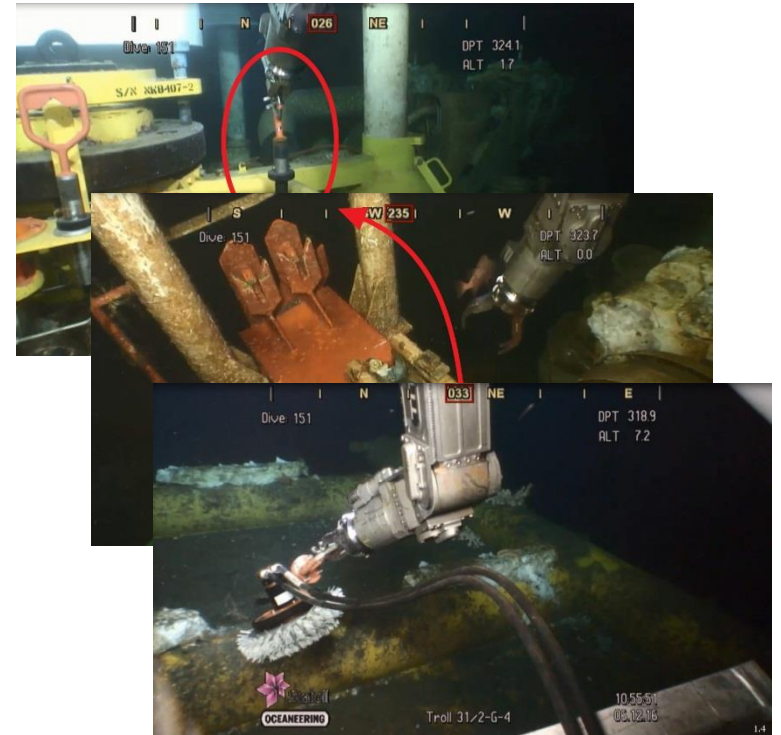
Demo Time! Forus - Dec. 6th 2016

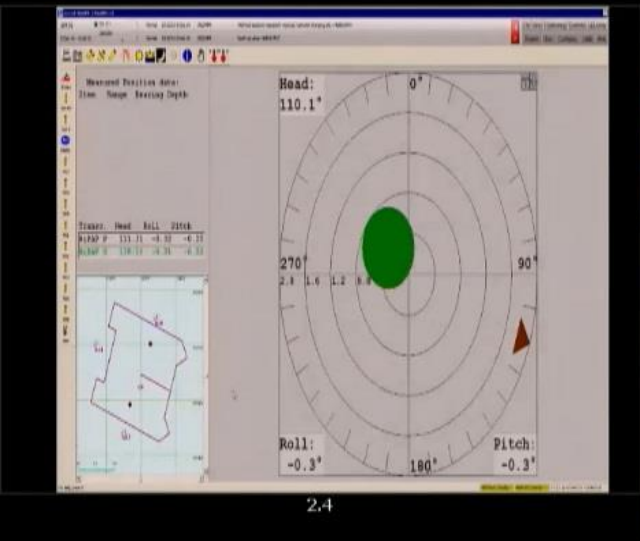


Demo - Songa Endurance - Dec. 6th 2016

ROV Tasks

1. Stab HP-Cap High Pressure seal test line with dummy stab.
2. Lay down and raise riser EI. Connector support frame.
3. Clean a section of template hatch structure.





1.1

1.2

1.3

4G LTE Broadband Performance

- **Latency (Ping)**

- Data: 58 ms
- Video: 200 – 400 ms

- **Bandwidth**

- Data : 0,2 Mbits/s
- Video: 2 x 2 Mbit/s

```
Reply from 10.165.183.146: bytes=32 time=57ms TTL=62
Reply from 10.165.183.146: bytes=32 time=64ms TTL=62
Reply from 10.165.183.146: bytes=32 time=50ms TTL=62
Reply from 10.165.183.146: bytes=32 time=69ms TTL=62
Reply from 10.165.183.146: bytes=32 time=53ms TTL=62
Reply from 10.165.183.146: bytes=32 time=67ms TTL=62
Reply from 10.165.183.146: bytes=32 time=52ms TTL=62
Reply from 10.165.183.146: bytes=32 time=47ms TTL=62
Reply from 10.165.183.146: bytes=32 time=44ms TTL=62
Reply from 10.165.183.146: bytes=32 time=79ms TTL=62
Reply from 10.165.183.146: bytes=32 time=50ms TTL=62
Reply from 10.165.183.146: bytes=32 time=67ms TTL=62
Reply from 10.165.183.146: bytes=32 time=56ms TTL=62
Reply from 10.165.183.146: bytes=32 time=49ms TTL=62
Reply from 10.165.183.146: bytes=32 time=46ms TTL=62
Reply from 10.165.183.146: bytes=32 time=59ms TTL=62
Reply from 10.165.183.146: bytes=32 time=62ms TTL=62
Reply from 10.165.183.146: bytes=32 time=47ms TTL=62
Reply from 10.165.183.146: bytes=32 time=46ms TTL=62
Reply from 10.165.183.146: bytes=32 time=57ms TTL=62
Reply from 10.165.183.146: bytes=32 time=67ms TTL=62
Reply from 10.165.183.146: bytes=32 time=73ms TTL=62
Reply from 10.165.183.146: bytes=32 time=72ms TTL=62
Reply from 10.165.183.146: bytes=32 time=64ms TTL=62
Reply from 10.165.183.146: bytes=32 time=64ms TTL=62
Reply from 10.165.183.146: bytes=32 time=63ms TTL=62
Reply from 10.165.183.146: bytes=32 time=63ms TTL=62
Reply from 10.165.183.146: bytes=32 time=72ms TTL=62
Reply from 10.165.183.146: bytes=32 time=53ms TTL=62
Reply from 10.165.183.146: bytes=32 time=69ms TTL=62
Reply from 10.165.183.146: bytes=32 time=75ms TTL=62
Reply from 10.165.183.146: bytes=32 time=56ms TTL=62
Reply from 10.165.183.146: bytes=32 time=56ms TTL=62
```

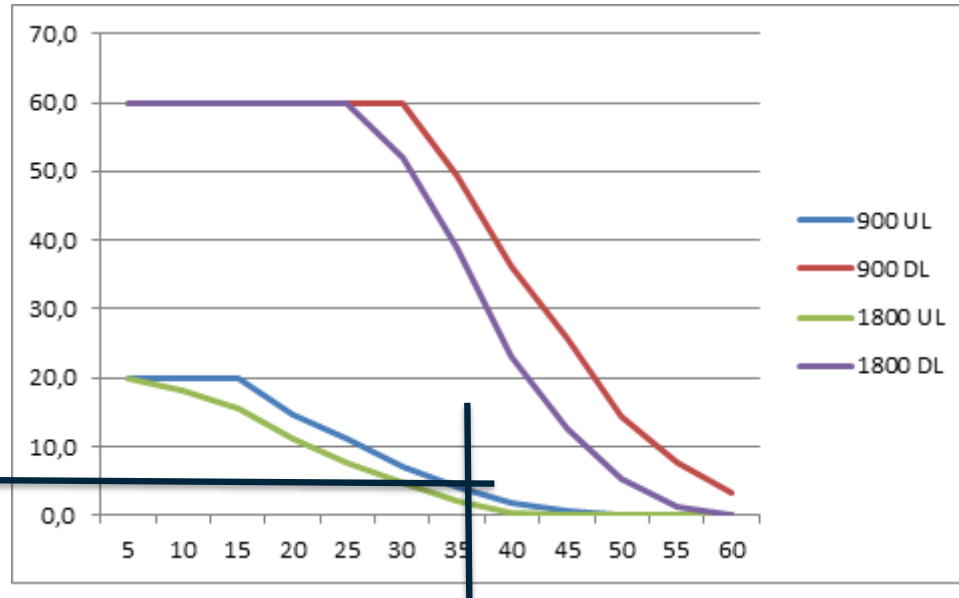


```
Reply from 10.165.183.146: bytes=32 time=54ms TTL=62
Reply from 10.165.183.146: bytes=32 time=53ms TTL=62
Reply from 10.165.183.146: bytes=32 time=43ms TTL=62

Ping statistics for 10.165.183.146:
    Packets: Sent = 7550, Received = 7538, Lost = 12 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 38ms, Maximum = 343ms, Average = 58ms
```

4G Coverage

5 mbps uplink

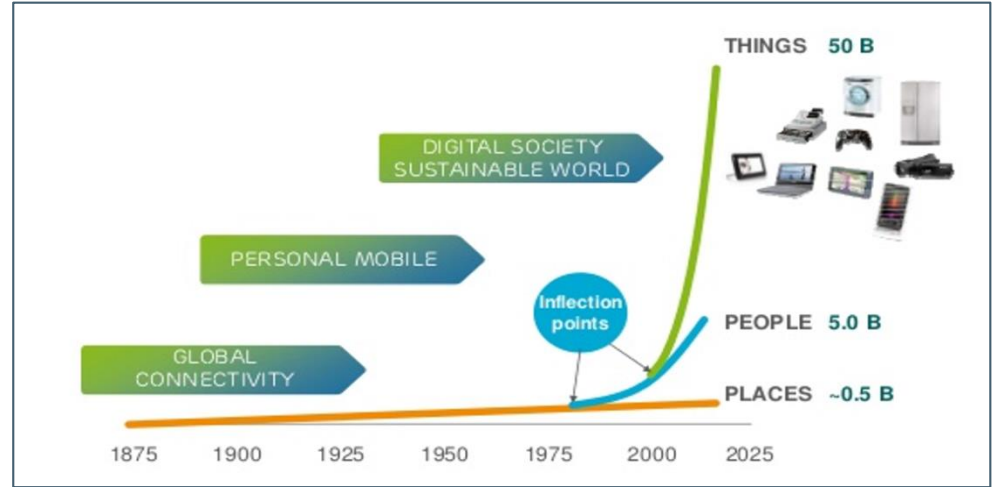


35 km from base station

Extending the scope for remote and autonomous operations – Supported by next generation mobile networks



The future speed



The Internet of Things

Technology Readiness Level (TRL)

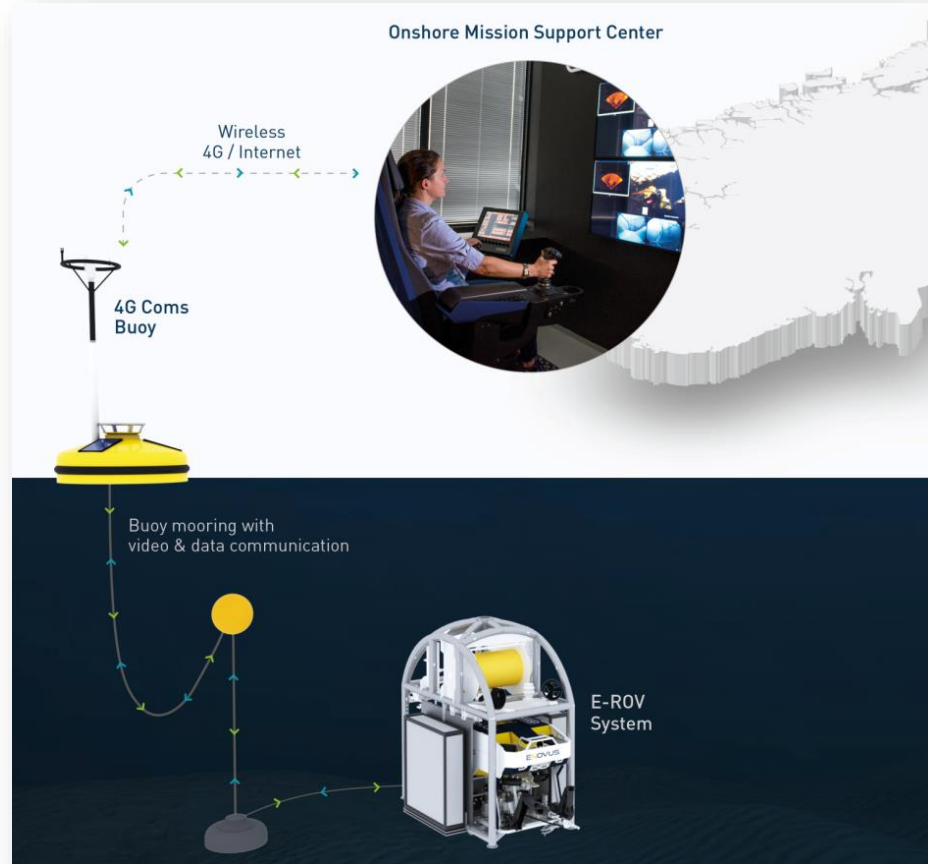
Describes the development stages in the qualification process and the degree of testing that is required to reach each stage.

Level	Development stage
TRL 0	Unproven idea/proposal
TRL 1	Concept demonstrated.
TRL 2	Concept validated.
TRL 3	New technology tested
TRL 4	Technology qualified for first use
TRL 5	Technology integration tested
TRL 6	Technology in operation
TRL 7	Proven technology

Stay tuned!

Statoil E-ROV Pilot

- Battery Powered WROV
- 4G LTE Data Buoy
- Onshore Control
- Pilot-test May 2017



Thank You for Your attention!

Please visit oceanearing.com for more information



Connecting What's Needed with What's Next™