



Enabling Autonomous Inspection Technology Solutions to Transform IMR Operations

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Inspection, Maintenance & Repair Today: Vessel Reliance

Inspection

- ROV
- General Visual Inspection



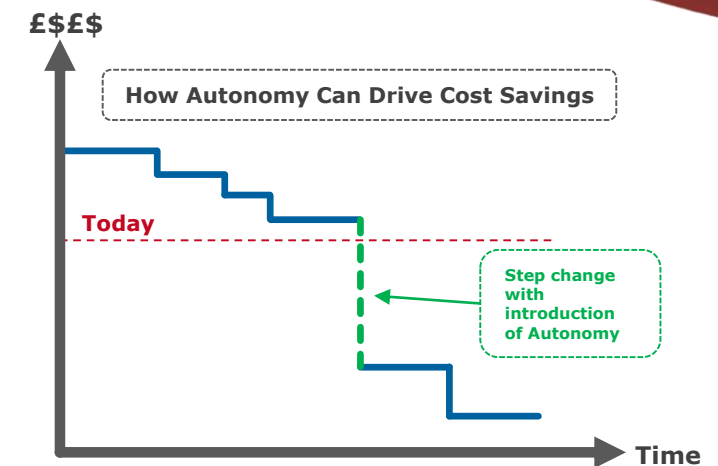
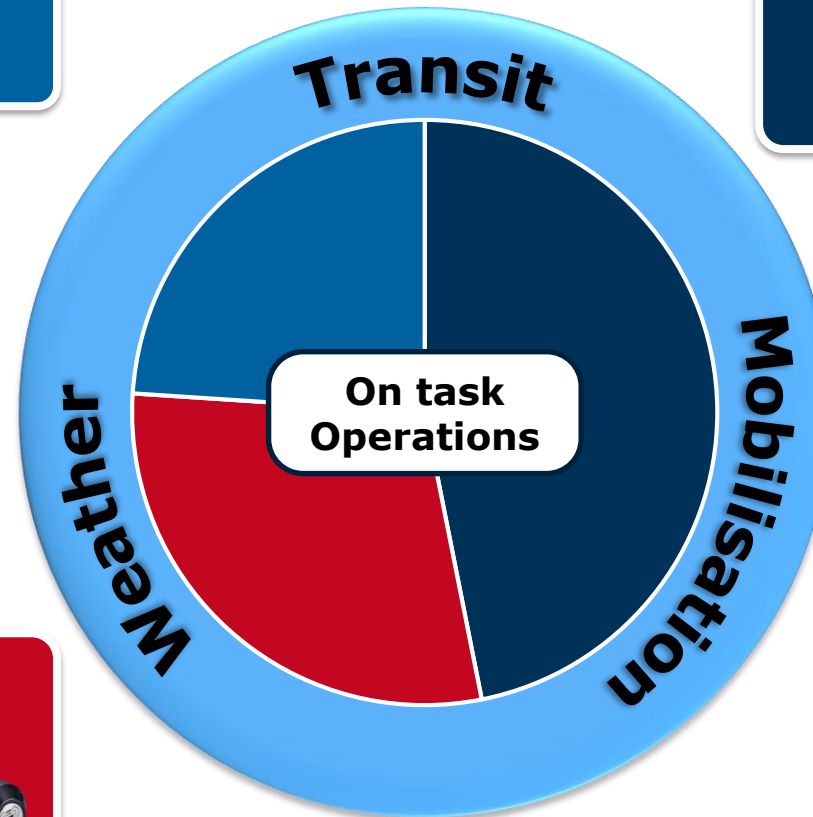
Maintenance

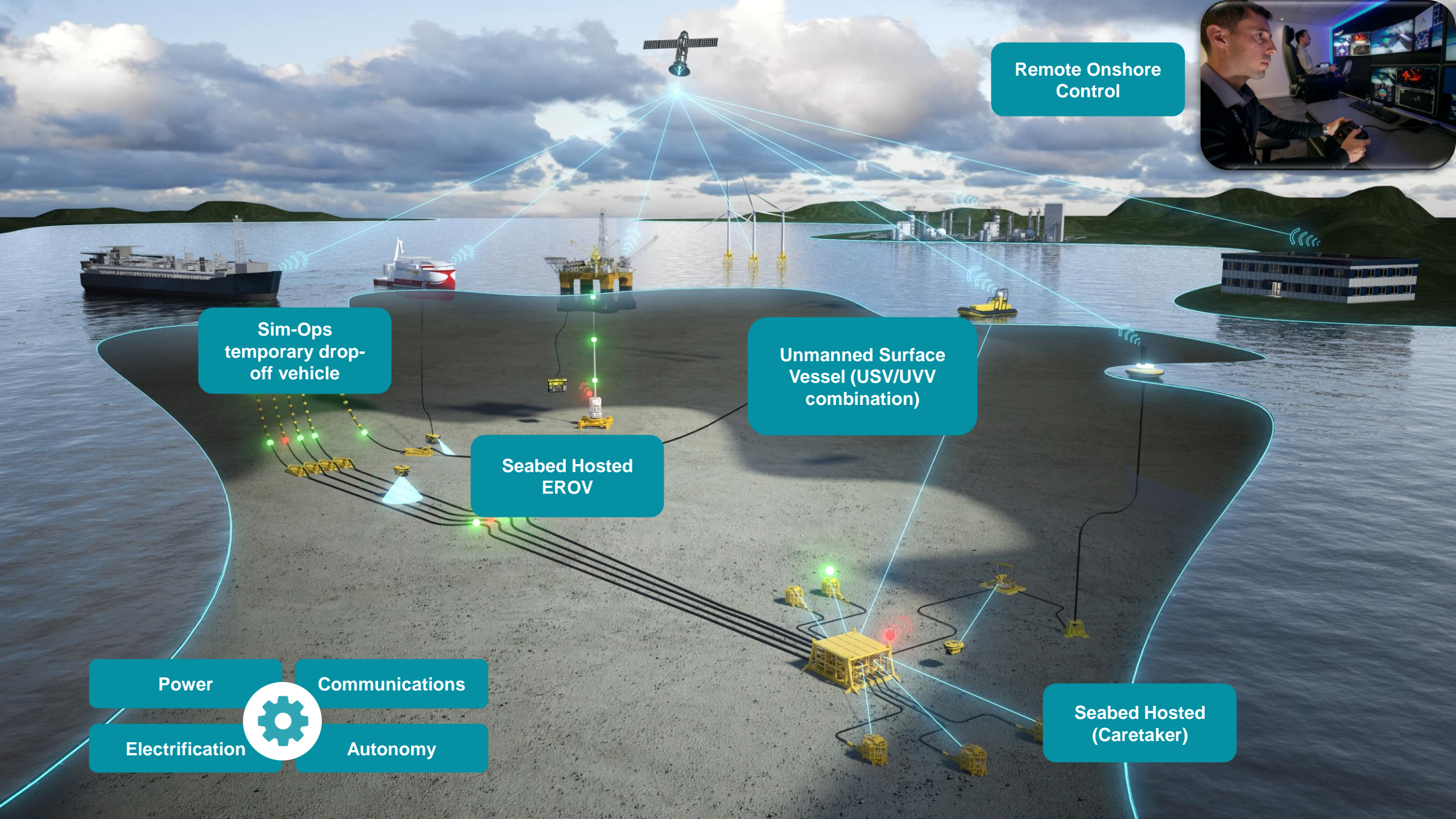
- Light Intervention
- Torque tool
- Manipulator operations



REPAIR

- Heavy Intervention
- Crane / Module handling
- High power tasks





Remote Onshore Control



Sim-Ops temporary drop-off vehicle

Unmanned Surface Vessel (USV/UVV combination)

Seabed Hosted EROV

Seabed Hosted (Caretaker)

Power

Communications

Electrification

Autonomy



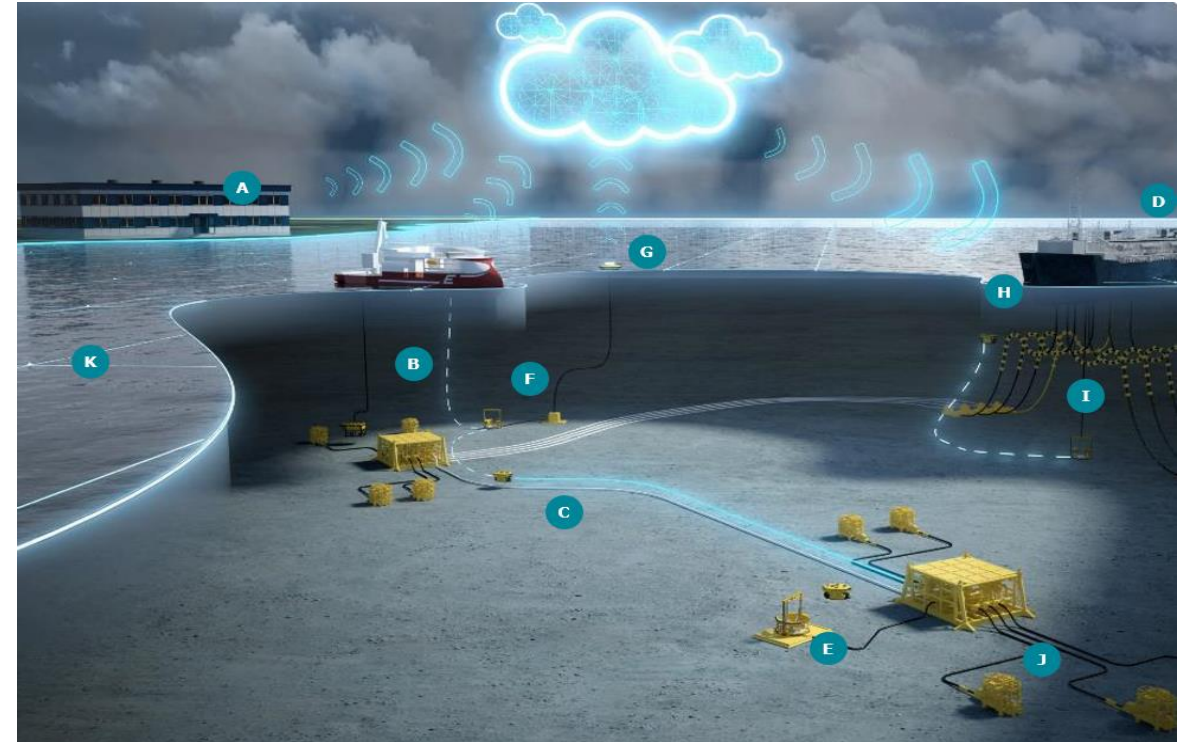
Today's Trends and Enabling Technologies

Technologies & Trends

- Access to high bandwidth 4G communications offshore
- Secure Wide Area Network connectivity
- Electrification of underwater systems
- Autonomy

What do we mean by Autonomy Underwater?

- The application of **intelligent behaviours** that enable underwater systems to operate independently or be remotely supervised
- Reduce the dependency on surface vessel support & required resources
- Increasing efficiency



Autonomous Technology Solutions

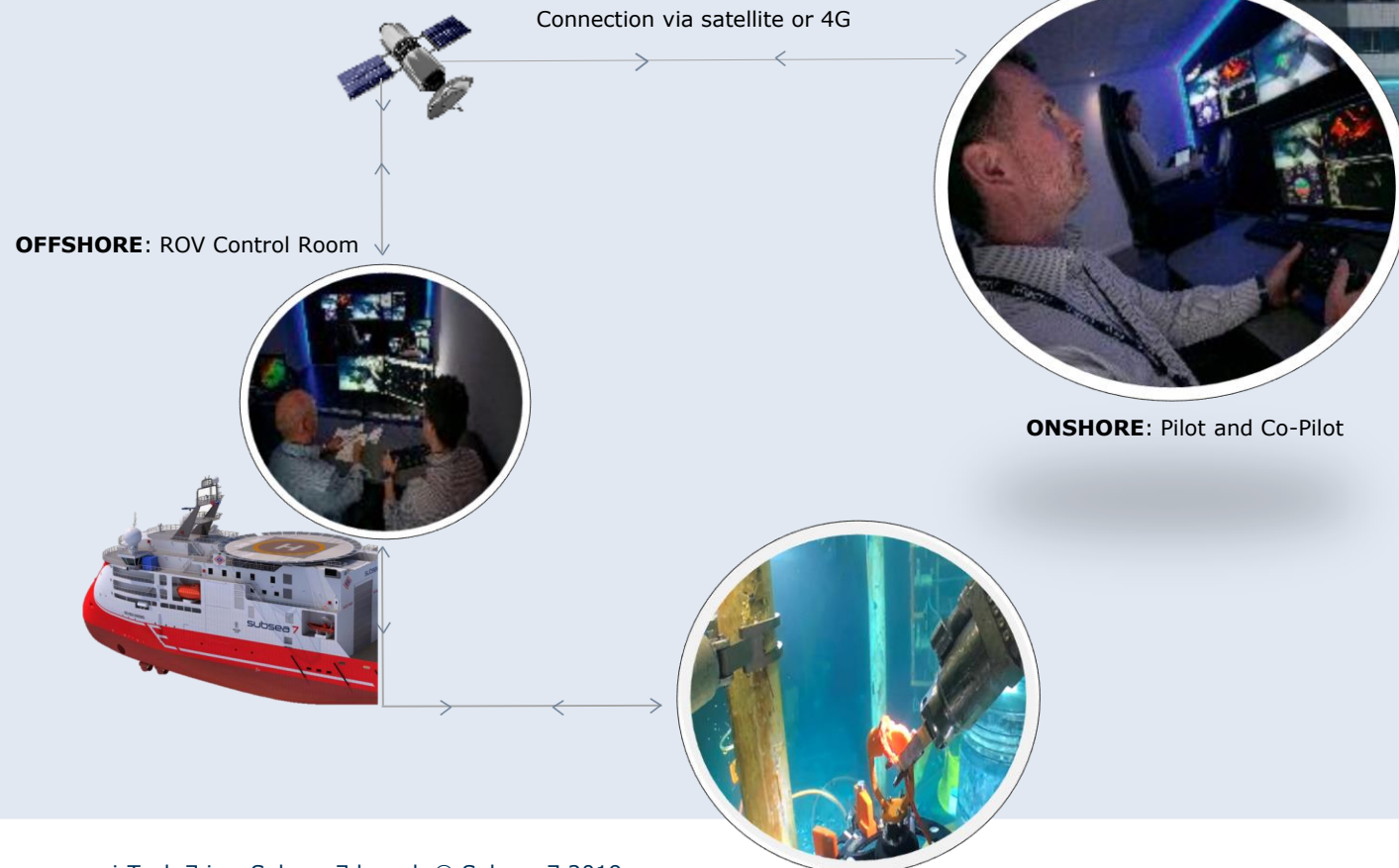
- | | |
|--------------------------------------|--|
| A Onshore Control Centres | G Surface Power Communication Buoy |
| B Autonomous Vehicle (SIMOPS) | H UWILD/Moorings |
| C Pipeline Inspection | I Riser Inspection, Condition Monitoring, Analysis & Integrity Management |
| D FPSO Hosted AIV | J RWOCs/Hydrates/Sampling |
| E Seabed Hosted AIV | K Autonomous Surface Vessel |
| F Subsea Enabled Vehicle | |

WROV Remote Piloting & Onshore Control Centre

Onshore Control Centres established, UK & Norway.

Technology building block

- High quality Low latency image transmission
- 4G LTE network access (*fourth-generation, high speed low latency*)
- Advanced control of vehicle and manipulation
- Generic Control supports different vehicle types

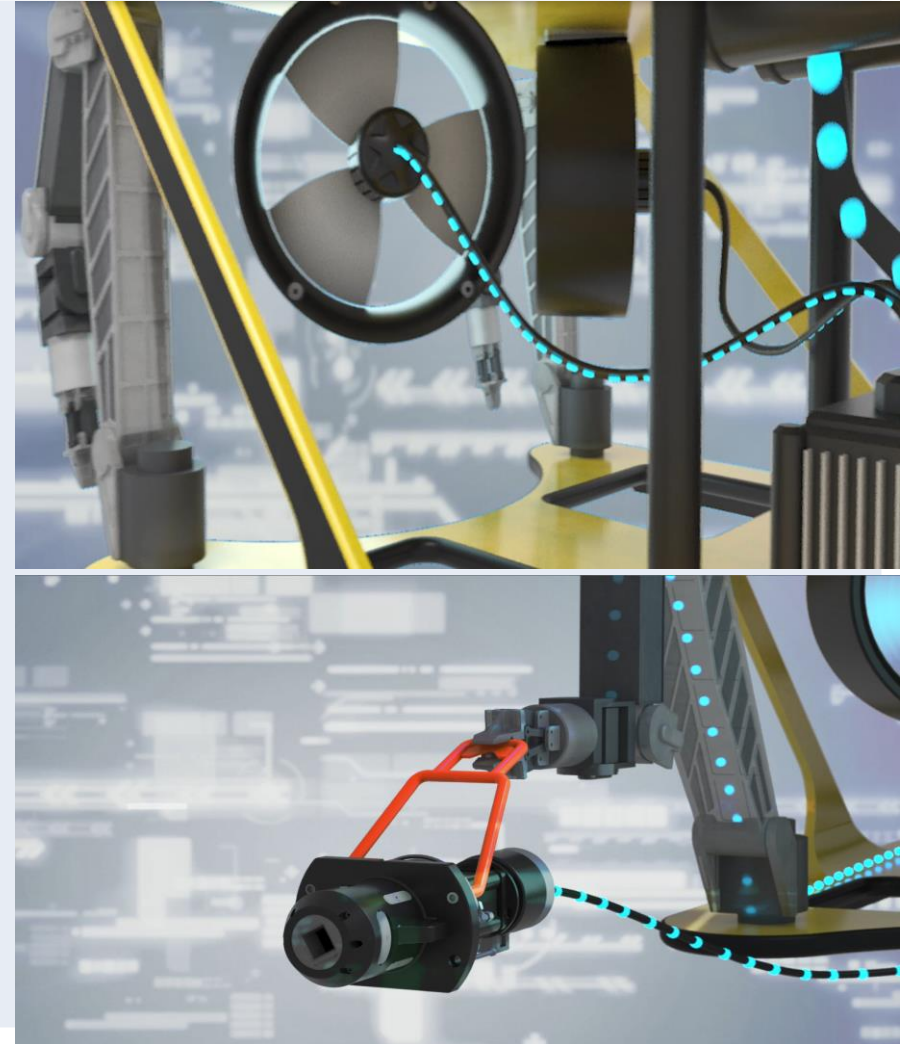


Electrification

- Electric Work Class ROV
- Electric propulsion and tooling
- Increased reliability
- Environmentally clean
- Seabed hosted enabled

Technology building block

- Advancement in POWER components
- Data enabled components
- Mature autonomy control
- Inductive power connections
- Advances in manipulation control



Autonomy

What we mean by Autonomy Underwater

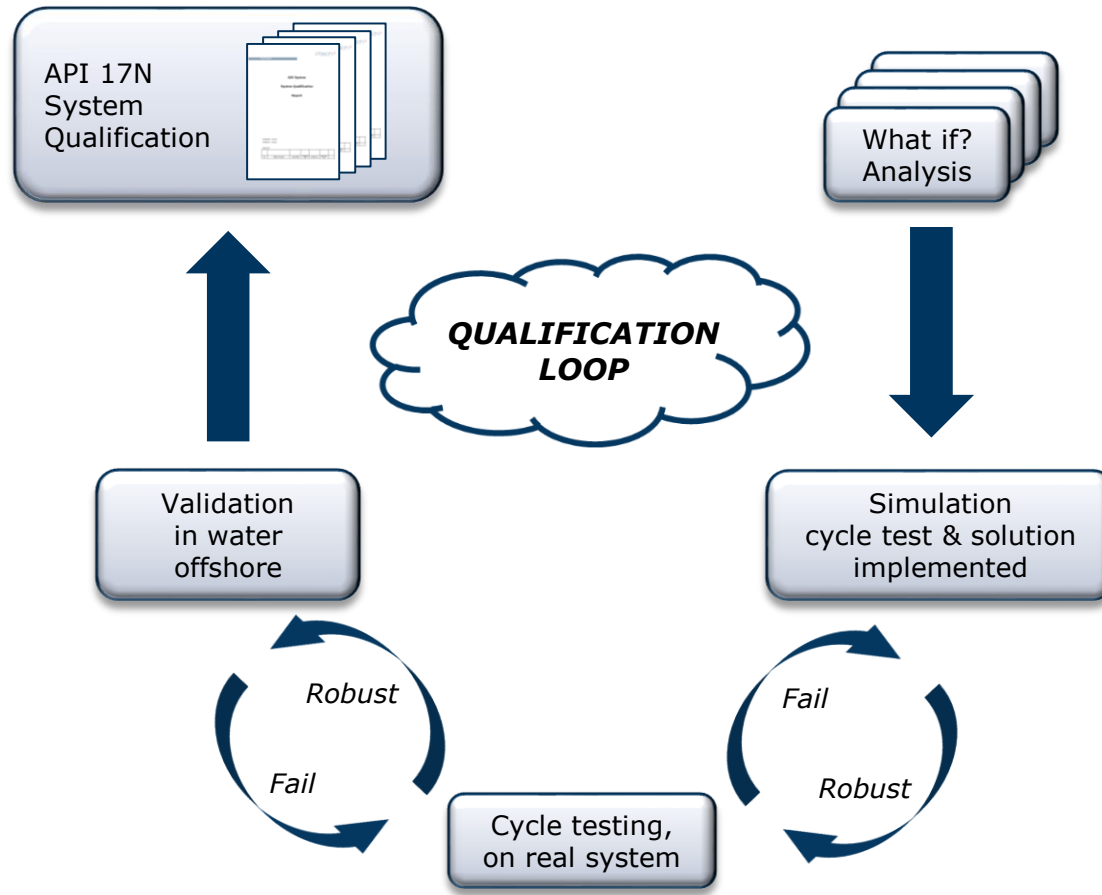
- Application of intelligent behaviours that enable underwater systems to operate independently
- Reduce the dependency on surface vessel support & required resources
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Technology building block

- Intelligent autonomous vehicle systems
- Advanced adaptive navigation
- Safe close autonomous inspection
- Simple robust mission planning
- Robust Launch and Recovery
- Vessel independent operation

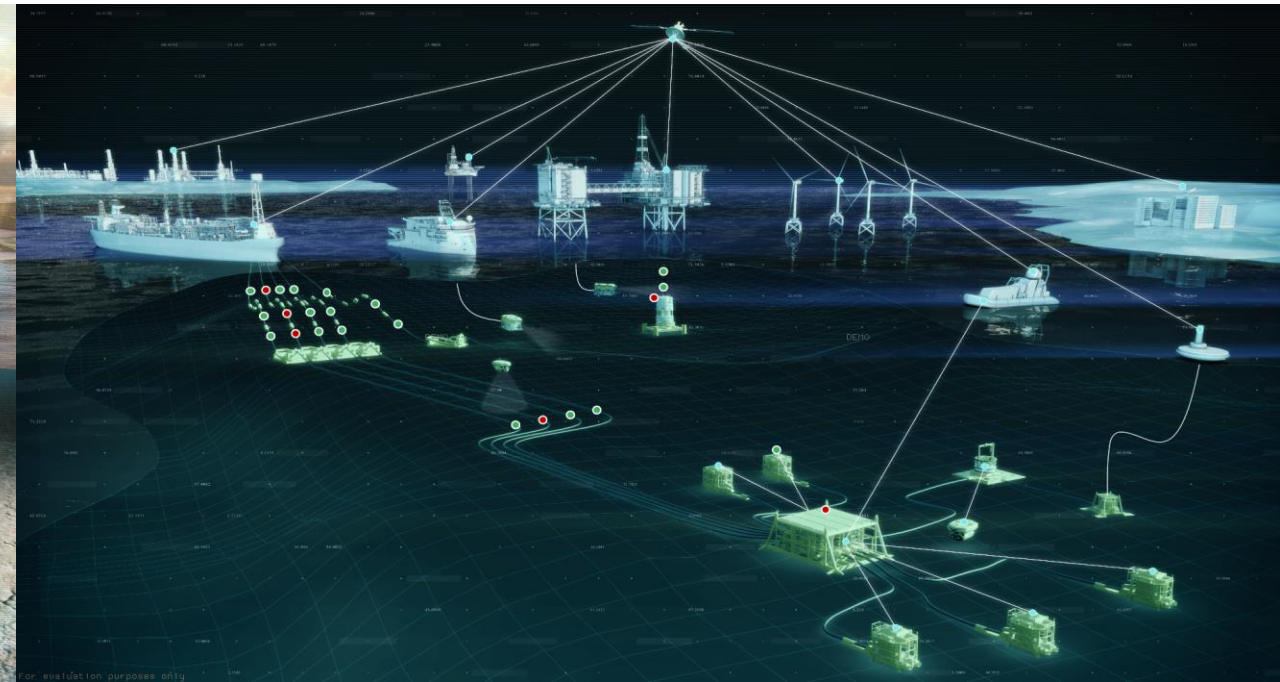


Qualification Case Study: Docking



Every single element is assessed, tested and validated.

Transforming ORM Operations



Remote Control



Autonomy



Electrification



Deployment



What Does the Next Generation Look Like?

Autonomy can enable a new method and significant change to the way IRM services are delivered today.

Field wide capability.

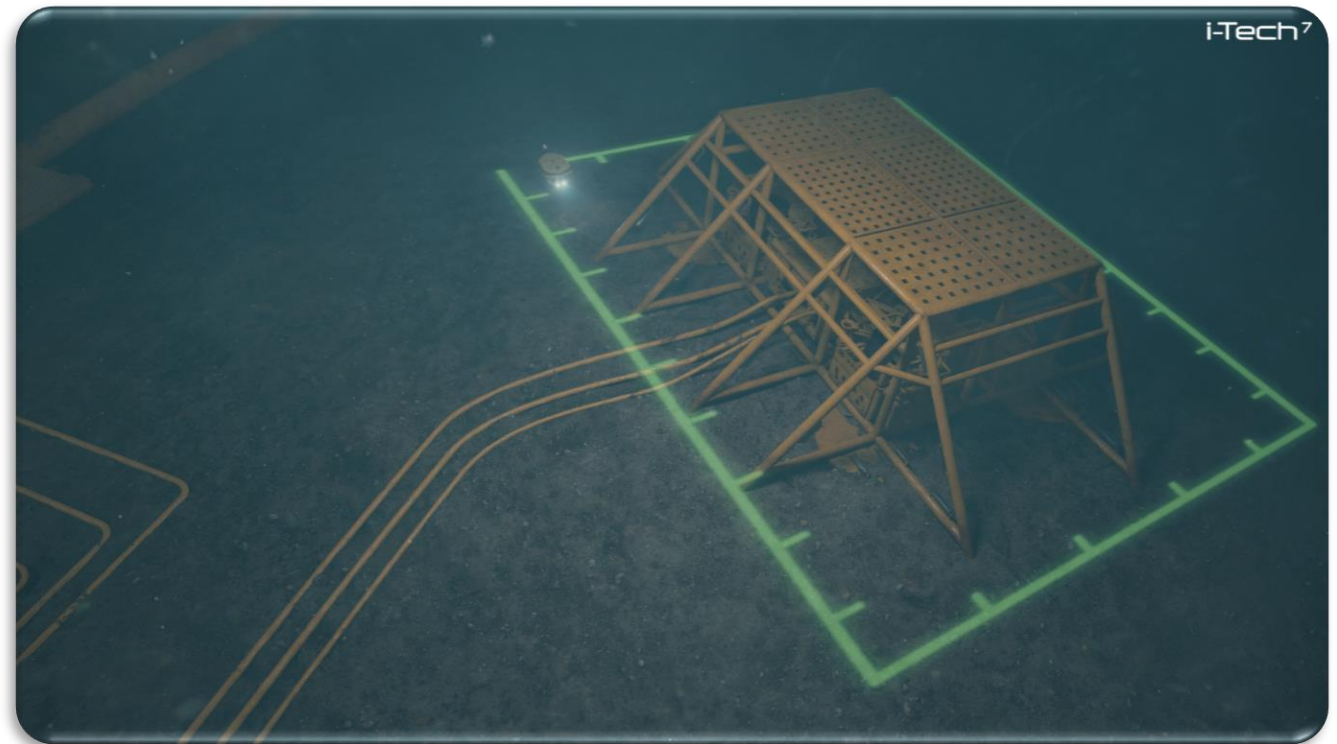
Seabed hosted vehicles with a 365 day presence.

Delivered with analytics driven methods with predictive asset integrity methods to maximise uptime and lower the total cost of ownership.

Capture and deliver the right data for actionable insights.

How can this benefit the industry?

- Reduced Cost and HSE exposure
- More efficient use of skilled personnel
- Operational flexibility
- Improved environmental impact



i-Tech Future Autonomy Vision

ANY QUESTIONS?

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