Dawn of the drone: A new method for delivering IRM services subsea

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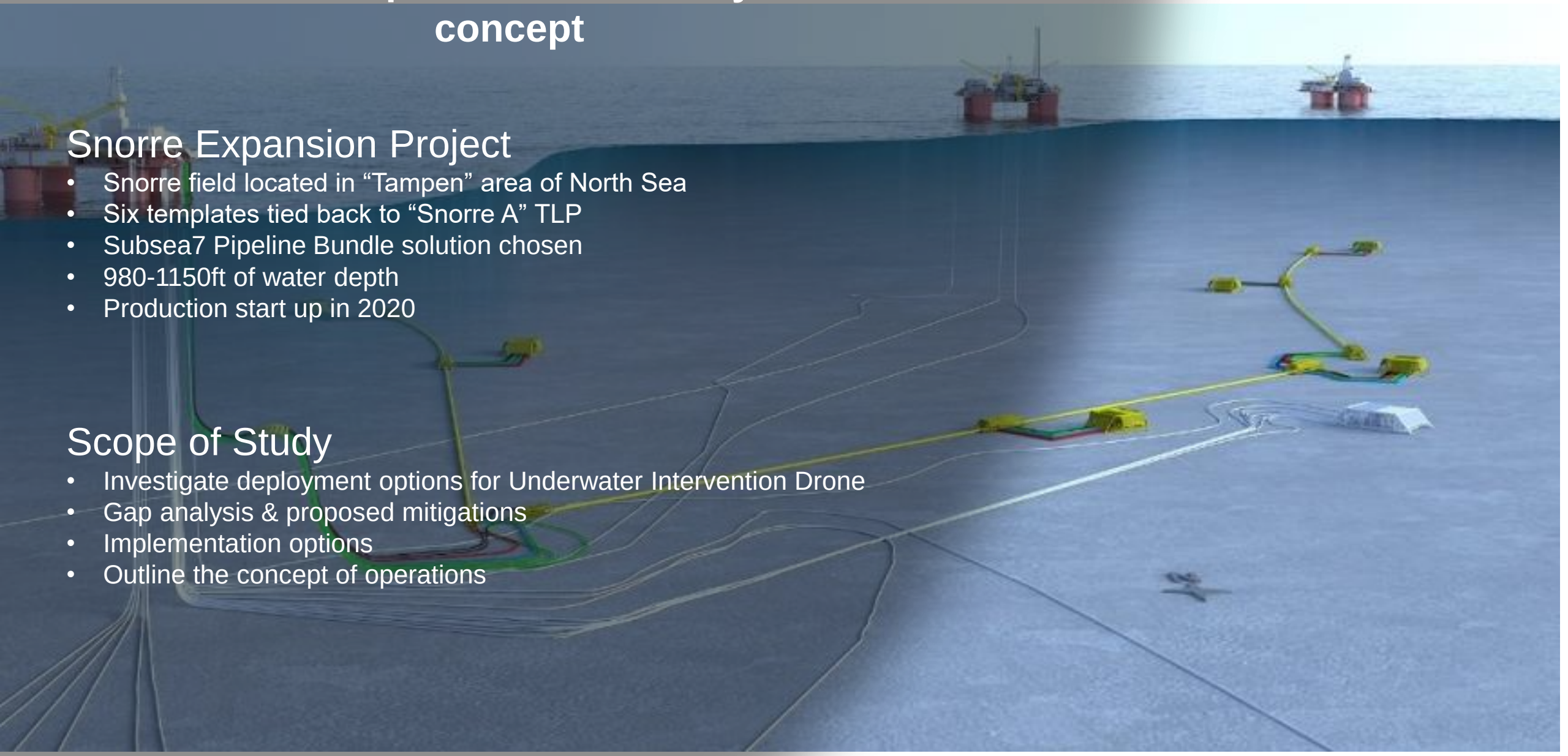
“Snorre A” development & Subsea Hybrid vehicle concept



Snorre Expansion Project

- Snorre field located in “Tampen” area of North Sea
- Six templates tied back to “Snorre A” TLP
- Subsea7 Pipeline Bundle solution chosen
- 980-1150ft of water depth
- Production start up in 2020

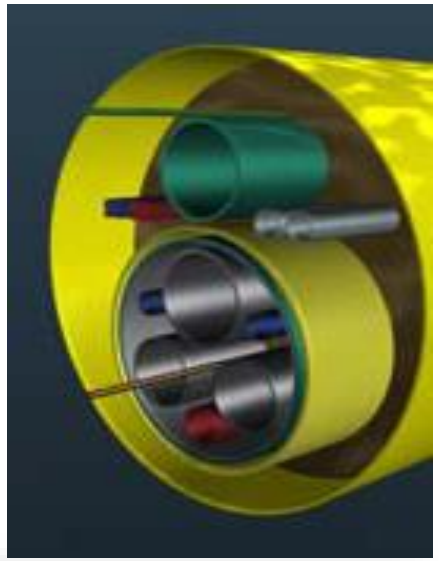
Scope of Study

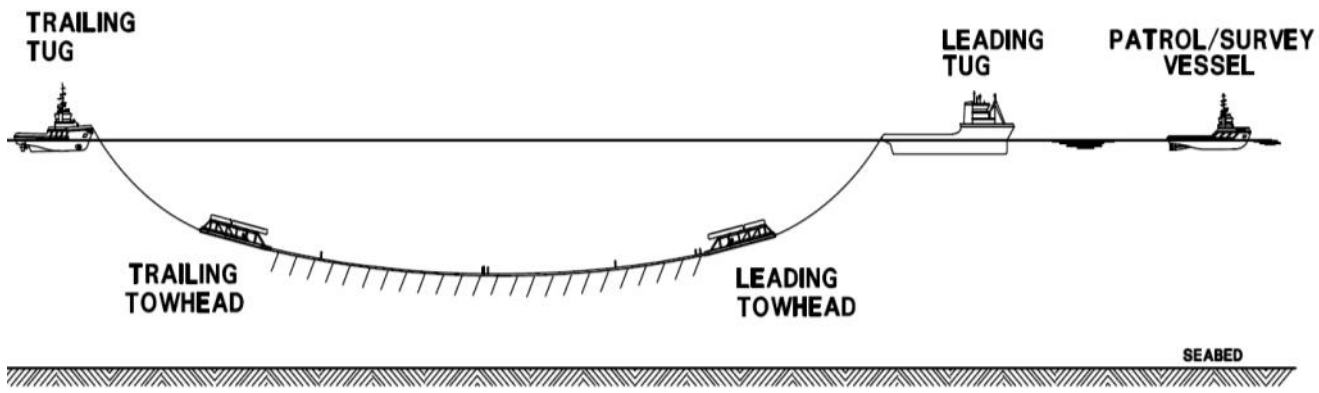
- Investigate deployment options for Underwater Intervention Drone
- Gap analysis & proposed mitigations
- Implementation options
- Outline the concept of operations

The UID™ Concept of Operations

Pipeline Bundle

- Onshore fabricated
- Carrier pipe contains flowlines and umbilicals
- Controlled depth towout to site
- Towhead with valves & jumper connections
- Power and communications for “Docking Stations”





Assessment of Operational Requirements

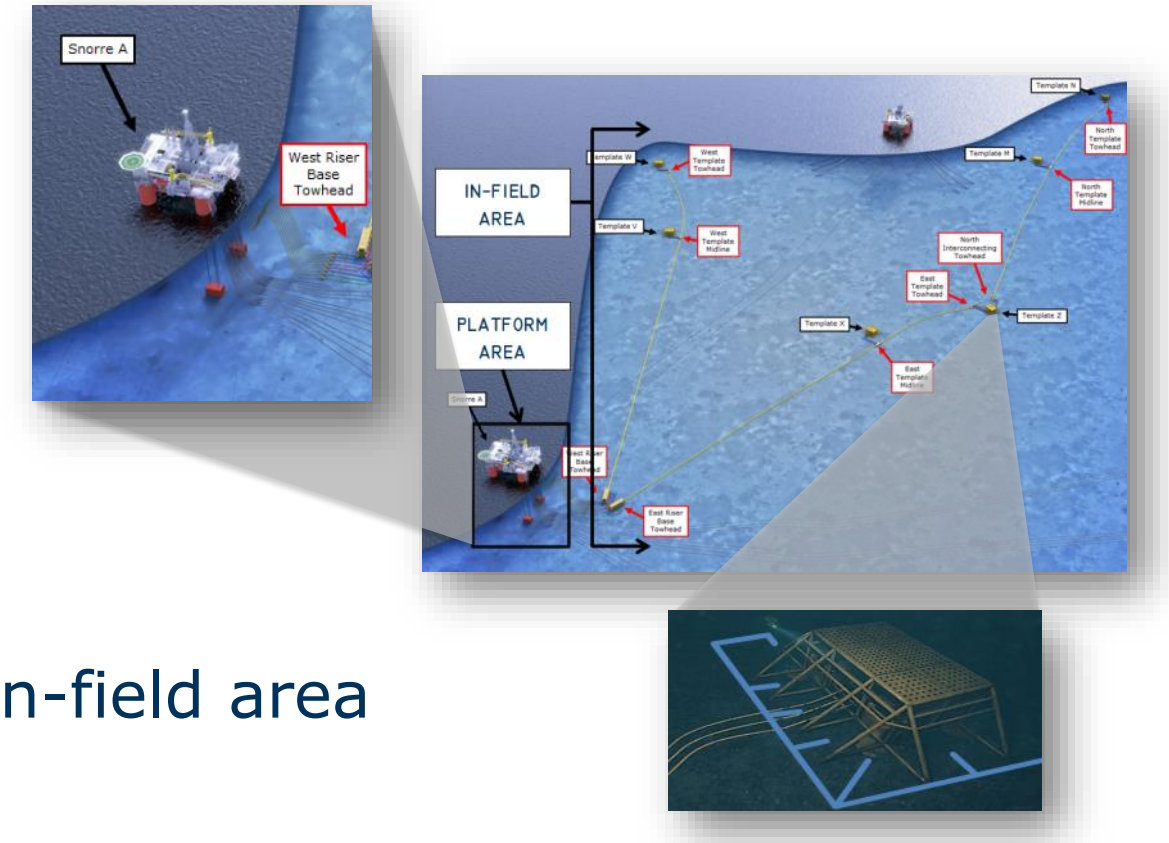
Platform Area

- Dynamic Risers
- Mid-water structures
- Marine growth cleaning

In-field area

- General Inspection
- Light Intervention

- ROV system for platform area
- Hybrid autonomous vehicle for In-field area



- ** Solutions could converge in future*

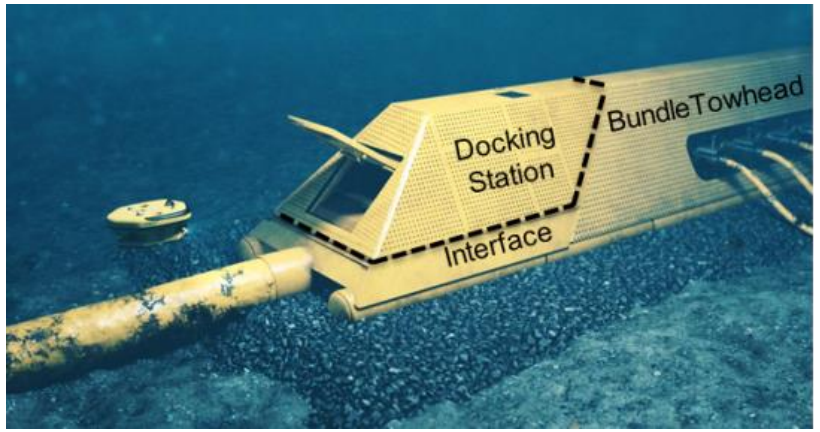
Vehicle and Docking station Characteristics

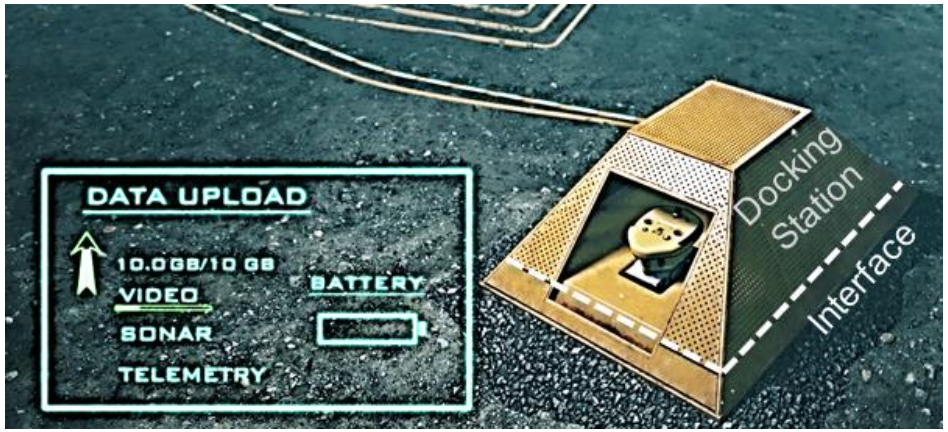
Vehicle

- Hybrid ROV/AUV
- Battery powered
- Advanced mission planning
- Autonomous flight & Inspections
- Real-time Intervention control

Infrastructure

- Subsea charging & comms
- Generic interface (7 locations)
- Docking station deployment options
- Intelligent power distribution
- Low maintenance

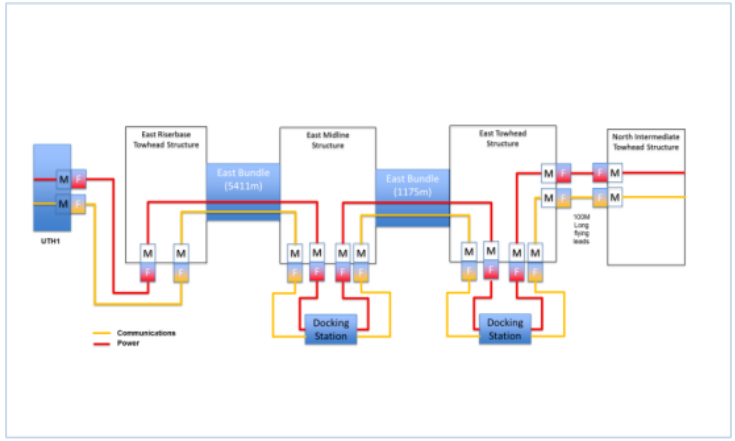




Docking Station Interface - Power and Communications

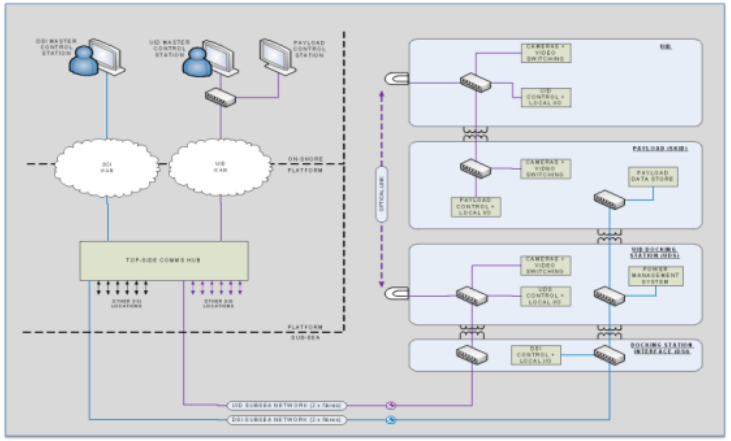
Power

- Parallel configuration
- Built in redundancy
- Managed system
- 1.5kW nominal - 10kW max
- 16Km transmission
- ROV serviceable components



Communications

- Point to Point fibre cable network
- Multiple user access protocol
- Seamless tunneling of data, secure
- Connected to onshore control centre
- High bandwidth low latency
- Inductive power and comms i/f



Conclusions

Study findings

- No technical show stoppers for UID™ service to be ready for 2020
- Some low risk technical developments required
- Hybrid Vehicle solution, Autonomous Inspection with human-in-the-loop intervention
- Docking stations can be de deployed in various configurations
- Careful management of Power and Communications network is essential

Benefits validated

- Save vessel days
- Reduced operational footprint offshore
- Reduced HSE exposure
- Reduced carbon footprint

UID™ - AN ENABLER FOR THE DIGITAL FUTURE OF IRM OPERATIONS

ANY QUESTIONS?