The Revolution in Marine Geodata Acquisition

What does this mean for our Future Workforce?

HSB Workshop 7 Sep 2023
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The Macro Picture
<table>
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<tr>
<th>ESG prominence in investment strategies</th>
<th>Digitalisation</th>
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<td>UN Sustainable Development Goals</td>
<td>Robotics and Automation (AI)</td>
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<td>Net-zero ambition of countries and companies</td>
<td>Cloud and IoT (Smart Sensors)</td>
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<td>Society expectation (MM and Gen Z)</td>
<td>Connectivity &amp; Communications</td>
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<td>Remote Operations</td>
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Diversity, Equity & Inclusion
Blue Economy - Offshore Energy Market Trends

- Very strong growth in Offshore Wind (Doubling every 4 years)
- Oil Field Services post covid recovery is flat for remainder of decade.
- Other offshore energy markets growing, CCS and Hydrogen. (Green hydrogen levelized cost expect to match blue hydrogen by 2030)

Sources: 4C Offshore December 2022, Fugro internal intelligence, Rystad
Data exclude China
Addressing this Growth
USV’s - A new way of acquiring geodata

Robots controlling Robots

Hydrographic USV’s
- Force Multiplier
- VLOS

2020 - Australia
BVLOS
First ROV Pipeline Inspection (Visual)
2022 Second vessel

2021 – North Sea
Platform and Buried Pipeline Inspection
2023 Second vessel

2022 – Persian Gulf
New USV market with UAE Government approval for BVLOS in April 2023.
Connectivity: The Key Enabler

Rapidly transforming market.

- **VSAT** enabling greater bandwidth. *B2B* Model
- **LEO** systems provide redundancy, in short term.
  - **Starlink**: *B2C*. “Best Efforts” only. NO SLA/CIR
  - **OneWeb**: *B2B*. Global in 2023. SLA
  - **Project Kuiper**: *B2C*? – Late 2024 services (2026 Deadline)
  - Telesat **Lightspeed**: Funding??
The Future is Not Just USV's
A convergence in operational models.
The Talent Challenge
Industry Talent Challenges

Diversity, Equity & Inclusion

Diversity of Workforce
- Limited female intake to STEM courses at university
- Retention challenges as careers progress

Offshore industry less (not) appealing
- 2014-2018 Oil & Gas downturn
- Environmentally aware generation.
- Offshore work less desirable
  - People not wanting to work offshore 180 days per year.

Equity & Inclusion
- Gender bias in management. 20% Female – Target 25% in 2025
- Homelife/ Family status
- Health
- Disability
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Mapping the Future Workforce
Essential Offshore Expertise

Offshore experience and skills continue to be highly valued.

- Core technical disciplines required on vessels
- Focus evolving towards preparing, deploying and maintaining critical systems.
- Less screen time, more tool time.
Sensor Trends
Integration and Simplification

Sensor Integrations
Integrated sensors (IMU)
Precalibration
“Plug and Play”

Software Simplification
Users abstracted from configuration complexity.
Non specialist operator model – reduced configurability and QC numerics.

Remote Control Capabilities
Internet enabled clients
Remote Desktop Connection.
Control and Monitoring from ROCs

- Controlling of certain Vessels, Vehicles and Machinery undertaken from ROCs.
- Monitoring of acquisition systems and edge systems.
- Data QC and Validation.
- Processing and Interpretation
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Implications for our Future Workforce
Offshore Career Pathways

Offshore roles continue to be fundamental.

- Automation and remote tools will change focus.
- Offshore roles will change and evolve.
- Convergence of traditional roles supported by cross training.
- Valued skills.
Acquisition Roles Transition Onshore

ROC’s become the hub for Geodata acquisition.

- Improved workforce diversity opportunities.
- Stronger onshore technical career paths.
- Improved Work/Life balance compared to traditional offshore roles.
Training the Future Generation

- May not have ever been offshore. (Can not go offshore)

- Optimised training to provide increased maritime awareness.

- Short offshore deployments to gain awareness.
Conclusions
Conclusions

Strong growth in offshore energy sector combined with technological development are driving a transformation.

Operational model for Uncrewed vessels will be replicated on Conventional vessels

Offshore roles will be equipment integrity focused.
- Mobilise,
- Configure,
- Maintain

Remote Operations provides an opportunity to retain people within industry and attract a more diverse workforce.