SEAR JIP

Leveraging long term collaboration and knowledge sharing to improve outcomes for subsea equipment operations in Northern Australian waters

SUT - Subsea Controls Down Under Conference

October 2022

Agenda

1 Project Overview

2 The Environment and Journey to date

3 Reliability Database & Lessons Learnt

4 Subsea Test Program - TASER

5 Outlook

6 Q&A

The Project

5 Operators in the region are participating in **Phase 9** of the SEAR JIP coordinated by **Wood**:

Goal: Reduce subsea equipment failures through **COLLABORATION** and **KNOWLEDGE SHARING**

Why?

Subsea equipment operating in **warm Australian waters** is exposed to **harsh environments where marine fouling flourishes**, resulting in premature failed or faulty equipment.

Acknowledging Northern Australia's **unique operating environment** the SEAR JIP aims counteract regional operating challenges and increases the reliability, operability of subsea equipment.

The Environment

Northern Australian waters are uniquely harsh on subsea equipment.

- Warm, tropical waters (surface ~28°C)
- High currents (regionally unique)
- High nutrients environment
- Frequent cyclones

High levels of **marine growth** and **calcareous deposition**

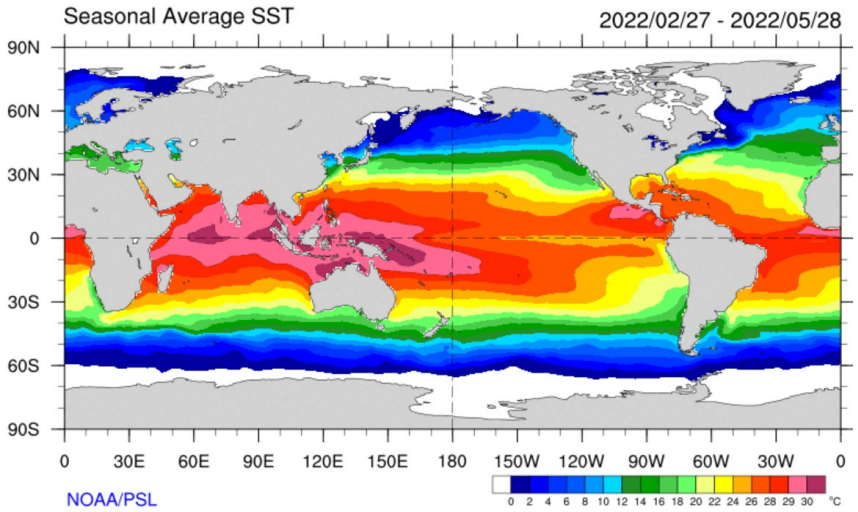


Image source: NOAA/PSL. (sst.seasonal.gif (800×510) (noaa.gov)).

JIP Journey

Phase 1-2

- Initial **failure data collection and estimated cost impact of failures**
- Initial engagement with Vendors

2014-2015

Phase 3-4

- **Built reliability database** framework (**ISO 14224**) for SCMs, EFLs Umbilicals
- Engaged with **UMF to address gas in umbilicals**
- **Established Subsea Test Program** (TASER) sponsored by **NERA**
- **Collaboration** between Operators, Universities and SEVs

2016-2017

Phase 5-6

- Completed **database** population for **SCMs, EFLs and Umbilicals**
- Designed, fabricated **4 Subsea Test Structures**. Deployed 3 test structures in strategic locations.
- Kick off **desktop study** (SINTEF) to determine **possible cause(s) of gassing & fluid migration in umbilicals**

2018-2019

Phase 7-8

- Engaged with **SCM OEMs** to **discuss improvement opportunities** on equipment reliability
- Gathered **insights into marine fouling** on deployed **STSs** via subsea inspection and oceanographic sensors.
- Engagement with **universities and vendors for STS retrieval** evaluation
- **Delivered SINTEF study** into the possible cause (s) of gassing and fluid migration in umbilicals

2020-2021

Phase 9 (Now!)

- Continued populating database with reliability data and lessons learned.
- **Deployed final STS**. Gathered **insight on fouling** of deployed **STSs** via subsea inspection and oceanographic sensors.
- Engagement with **university and vendors** for **STS retrieval evaluation program**. **First retrievals happened Oct 2022!**
- Developing industry **Regional Guidance for Subsea Equipment in Norther Australian Waters** based **on lessons shared and good practice** from participants.

2022

Index: UMF: Umbilical Manufacture Federation; SCM: Subsea Control Module; EFL: Electrical Flying Lead; TASER: Transforming Australia Subsea Equipment Reliability; STS: Subsea Test Structure; SEV: Subsea Equipment Vendor;

Collaboration in Action

Series of workshops between SEAR participants designed to share best practices, operational experience and lessons learned in a collaborative environment.

2017-2018

21 lessons learned forum
Topics: marine fouling interventions & tooling, HPU lessons learned, umbilical repair, EFL failures, low IR issues, and VIPER V-LIFE, , flexible pipe connector HISC, sensor failures, HPU lessons learned, etc.

2019-2020

10 lessons learned forums
Topics: SCM best practice, EFL/HFL best practice, SPCS Design specifications, Choke Valve best practice, Optimization & Toolbox Cleaning Marine Fouling, Flexible Pipes

2021-now

4 lessons learned forums
Topics: ROV tooling for interventions, EFL Connector Failure Investigations, Calcareous deposition, SCM intervention lessons learnt, instrument distribution, IMR campaign planning and offshore communications

All experience is captured in the database and being fed into **Industry Regional Guidance Note**

Reliability Database

WHAT?

Low cost / high value method of capturing, **sharing failures and lessons learnt** for subsea equipment in Australian waters.

GOAL

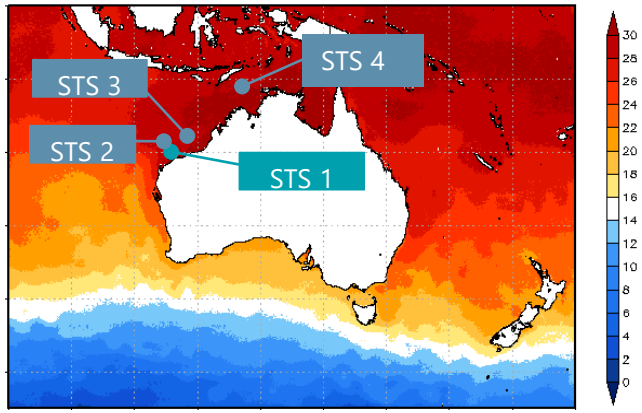
Benchmark equipment performance and **drive reliability improvements** for subsea equipment in Australian waters using **region specific reliability data and lessons learnt.**

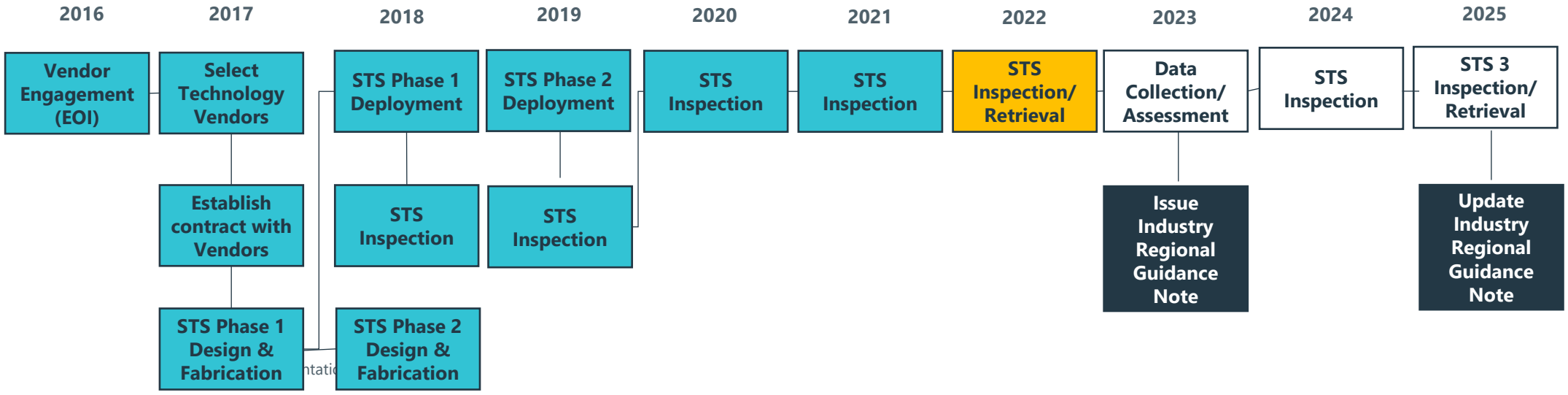
- Regular collection of asset and failure event information:
  - ✓ **266 SCMs, 657 EFLs and 93 Umbilical** collected across **~19 fields** from **5 participating operators** extending back to **2008.**
  - ✓ Data collected to **ISO 14224.** Provides **standardized methodology** against **industry recognised framework.**
- Reliability dashboard reporting:
  - ✓ **Anonymization** of data and results
  - ✓ Allows **benchmarking of performance** in the region against **regional data set**.
  - ✓ Allows **comparison** with other industry data sources
- Regular **sharing of lessons learnt** captured in database
- Reliability dashboard reports **shared with Vendors**

Subsea Test Program - TASER

Goal: Transforming Australia Subsea Equipment Reliability (TASER) is a subset of SEAR JIP and aims to transform Australia subsea equipment reliability by reducing failures from marine fouling in Australian waters.

- **Collaborative industry effort**, across operators, universities and suppliers, to address the root causes of marine fouling challenges
- Game changing technology in '**living laboratories**'
- Subsea Test Structure (STS) will be **underwater for at least 3 years**
- Lessons learned on the testing program will be shared back to vendors, enabling equipment reliability issues to be designed out





TASER Phases 1 & 2

Operators collaborating with TASER :

Collaboration with:

NERA NATIONAL ENERGY RESOURCES AUSTRALIA

Vendors collaborating with TASER :

Highlights:

- Design, fabrication and deployment of 4 Subsea Test Structures.
- Over 600 Samples loaned to be tested across the 4 STSs: **Innovative coatings and materials, specialised SCMMB configurations, ROV receptacles, Electrical connectors, hydraulic couplers and anode and cavity tests.**
- Annual subsea visual inspection of samples and collection of oceanographic data from the seabed.
- **Recent retrieval of 1st and 2nd STS in Oct 2022**
- Initial observations and oceanographic data collected from the field providing insights on fouling patterns as well as early indicators of technology performance.

Outlook

- **CONTINUE LONG TERM COLLABORATIVE** effort across a large group of Australian Subsea System Operators **sharing lessons learnt, experience and best practice**

- **CONTINUED COLLECTION** of reliability data for operations in Northern Australian waters:
  - Continue to **populate** the SEAR JIP Reliability Database
  - Continue to **share with vendors** equipment reliability performance as the database grows

- Continue to identify/consolidate best practice and lessons learned to feed into **INDUSTRY REGIONAL GUIDANCE:**
  - **Delivered** marine fouling cleaning toolbox
  - **Capture** lessons learned and best practice and align as regional guidance to widely use standard for subsea equipment **API 17F**
  - **Deliver** TASER retrieval testing program in collaboration with vendors and university
  - **Compile** TASER findings and engage with vendors

Questions?

Thankyou

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