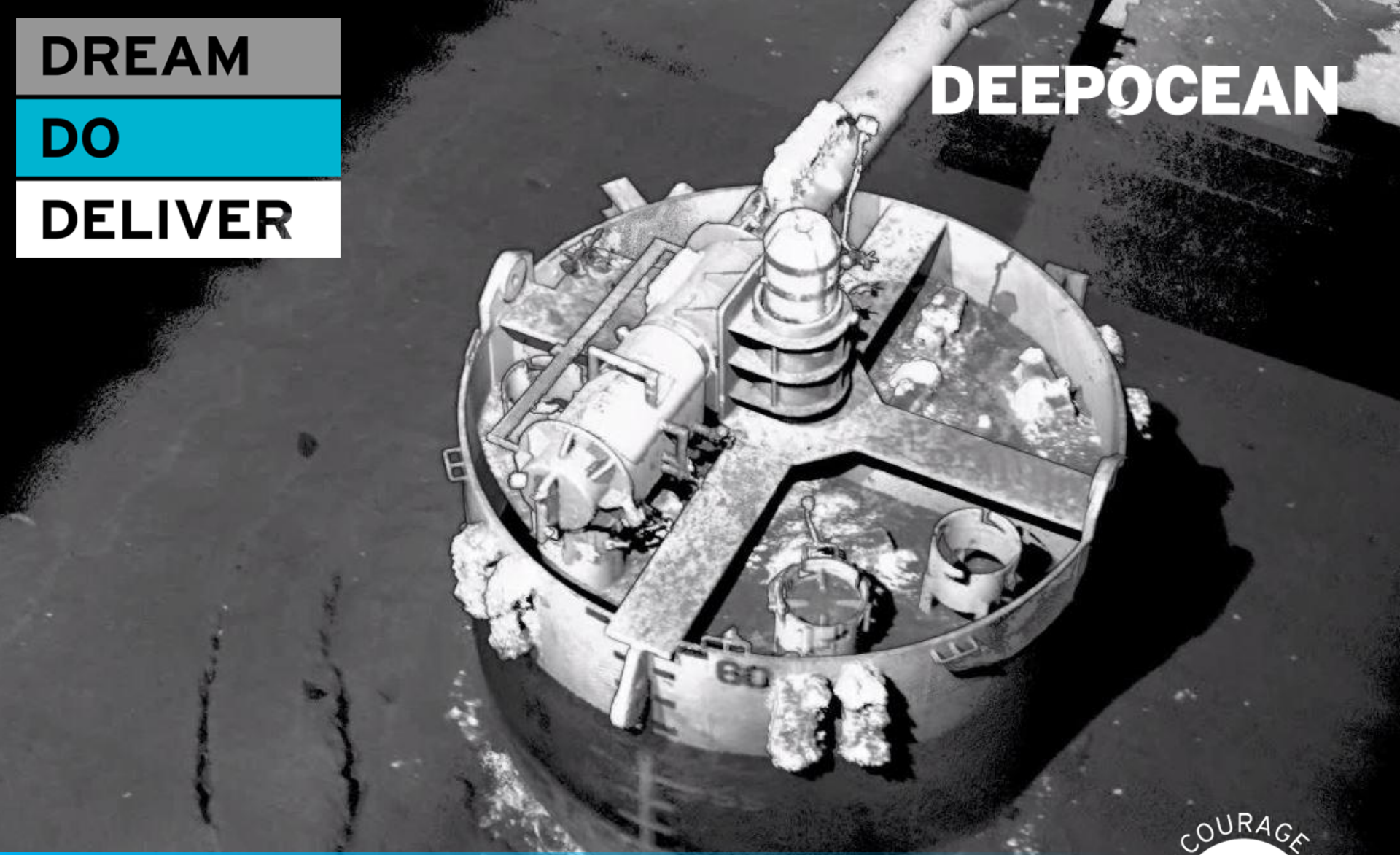
DREAM

DO

DELIVER

DEEPOCEAN



3D Laser Model for Planning Subsea Decom Activities

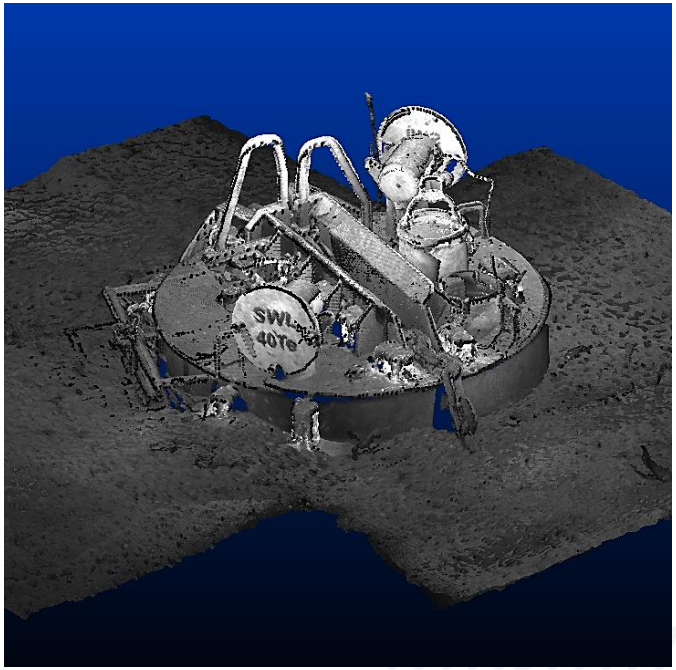
Decom North Sea - Lunch and Learn – September 2017

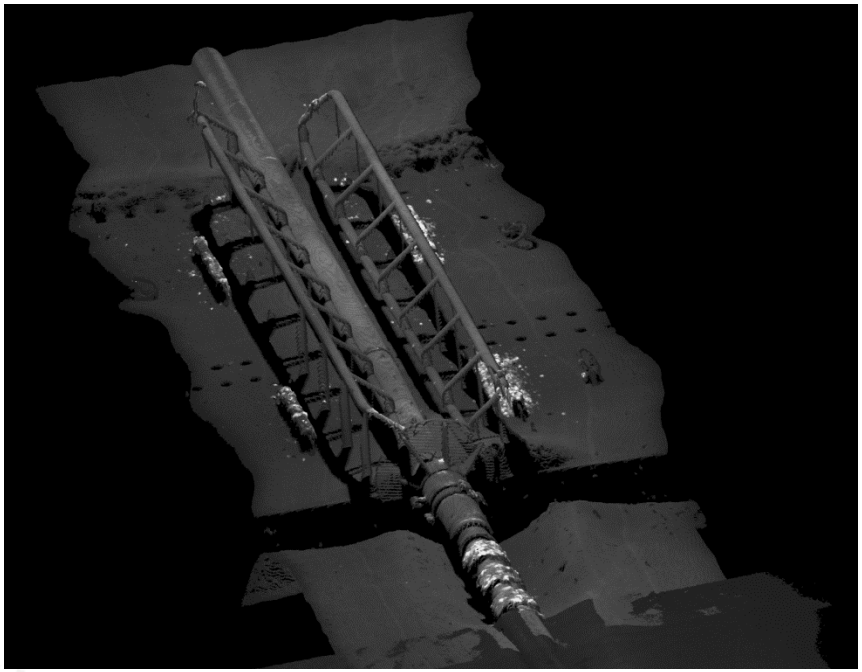
ATTITUDE • COURAGE • TEAMWORK • ACT FOR SAFETY

Maersk Connector

DEEPOCEAN

- DeepOcean and Me
- The Problem
- 3D Laser Model – What has been done so far
- How it is applicable in Decommissioning





About DeepOcean (and me)

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Talent

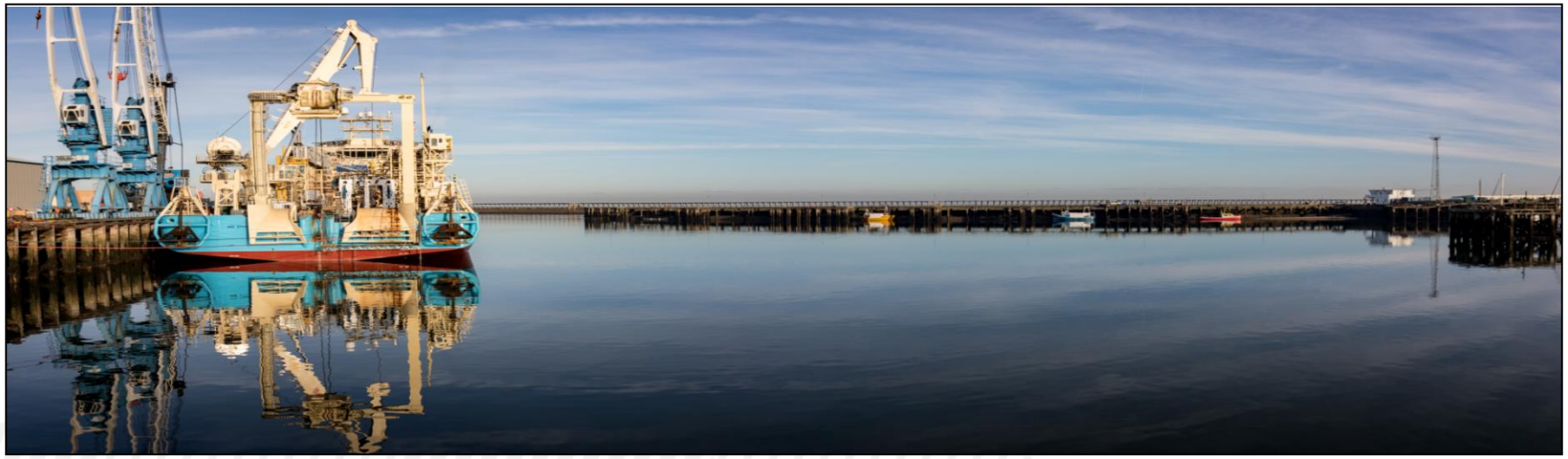
- 1100 employees world wide
- Graduate and apprentice intake
- Supporting regional effort to create talent and expand skills

DeepOcean

- 14 Vessels
- 15 Trenchers and 50 ROVs
- 11 offices world wide
- 8 Countries
- UK, Netherlands, Norway, Brazil, Mexico, Singapore, Dubai, Ghana

Sam Taylor

- 9 Years with DeepOcean on flexible installation and trenching projects
- Based in Aberdeen – Technical Sales Manger



Subsea Infrastructure Decommissioning

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Subsea Infrastructure

- Flexibles
- Structures
- Concrete Mattresses
- Grout / Sand Bags

Workscopes

- Subsea Cutting
- 00's of potential subsea lifts
- 000's te of recoverable material
- Efficient and Cost Effective Operations

Subsea Infrastructure Decommissioning

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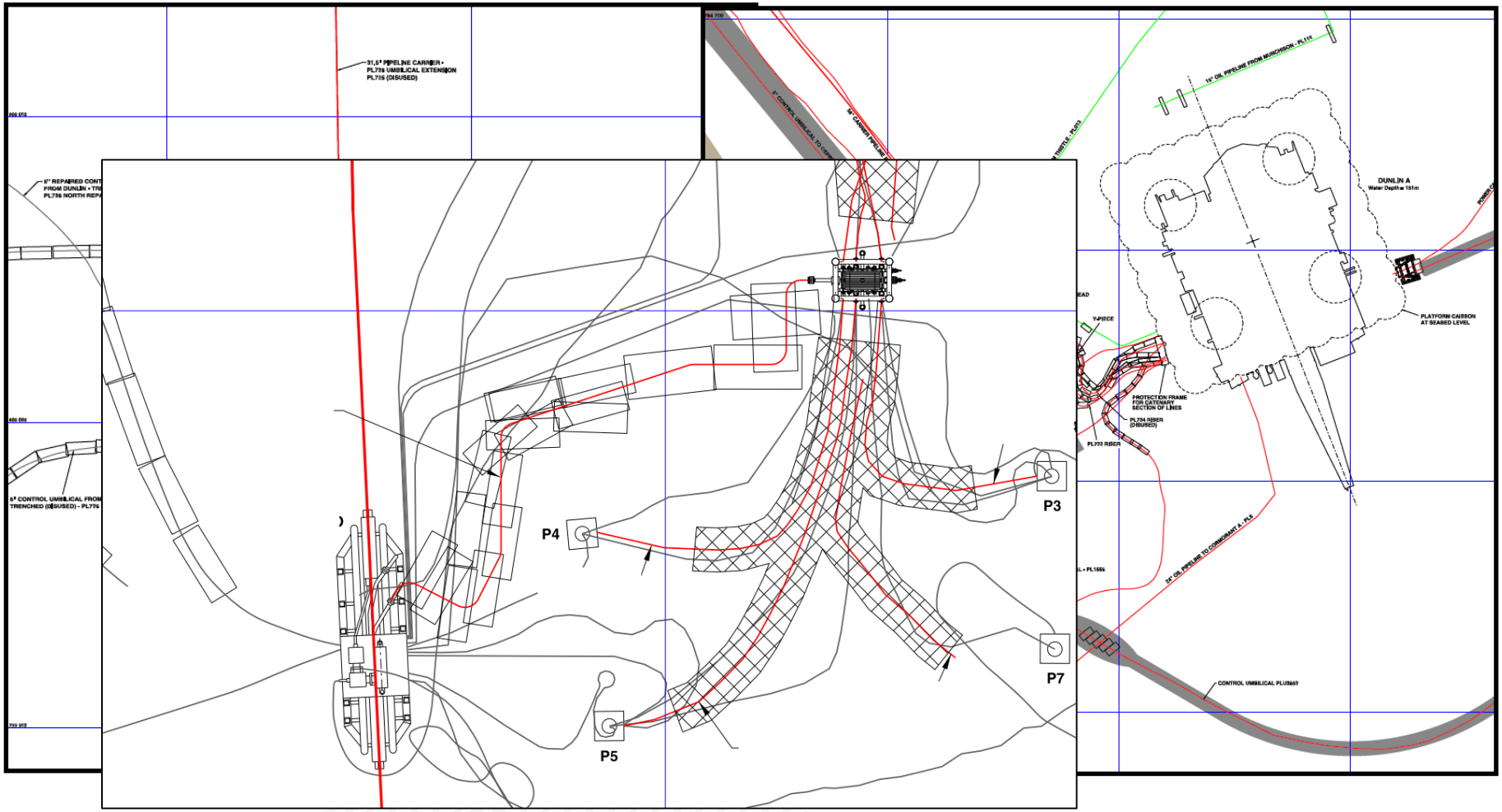
Available Data

- Field developed over many years
- 2D field Layout Drawings
  - As-Built is not As-Is!!!
- Long Term Inspection Survey Data
- ROV Video Survey (perhaps)
- Poor detail on debris which needs to be recovered

Planning

- Tool choice
- Sequencing of Operation
- Angle of Approach

What are we faced with?



3D Laser Model

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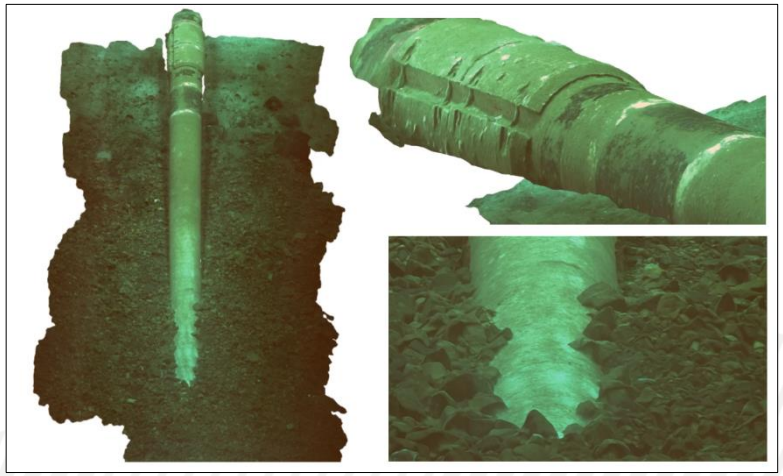
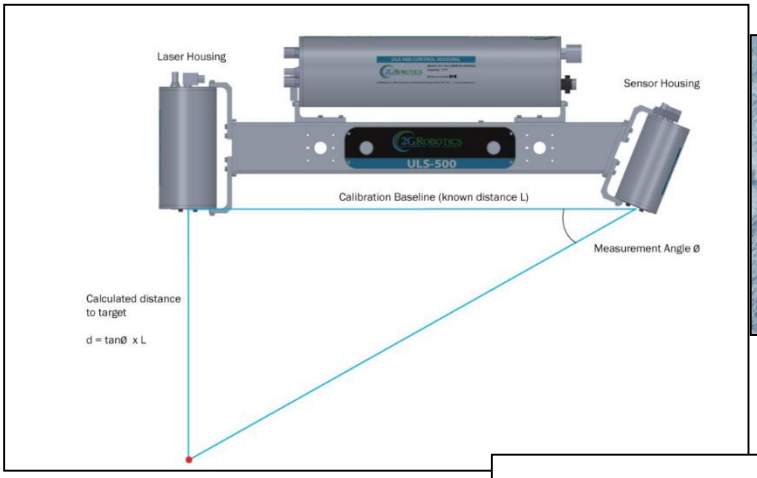
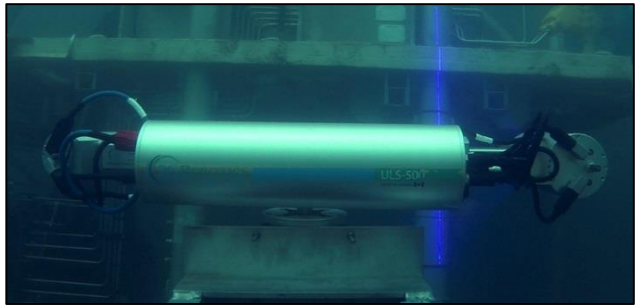
- We can now visualise & therefore understand assets underwater better than ever before, because new technology allows us to achieve unprecedented levels of high resolution 3D data subsea;
- A high level of understanding is fundamental to **good decision making**, **efficient operations**, **mitigation of risk** and providing the basis for **highly informed engineering** and asset management;
- **But!** we are currently only *scratching the surface* of what this 3D data can provide in terms of information for our clients; if it is even collected;
- When combined with emerging visualisation technology such as Virtual Reality and Augmented Reality, there is a paradigm shift in the way we can now view and understand the character & nature of assets subsea.

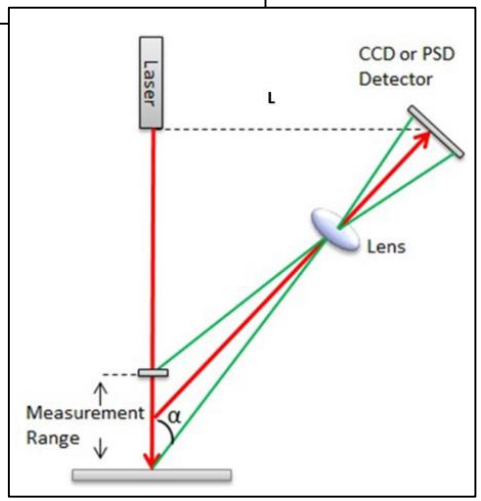


Subsea Laser Operation





Scanner uses triangulation
- Baseline, L
- Distance to target, d
- Measured Angle, θ



- The laser system is ROV mounted for *dynamic* operation subsea utilizing the latest Acoustically Aided Inertial Navigation (AAINS) technology.
- The system projects a continuous blue laser line onto structures & the line is detected by the system's camera (sensor), with the position then determined by trigonometry using the baseline between the laser emitter and the individual CCD array cell within the camera.
- Resulting laser data consists of very accurate high resolution 3D point cloud data (XYZ data), breaking new ground for metrology, reverse engineering and IMR tasks.

Highly Manipulative Data environment

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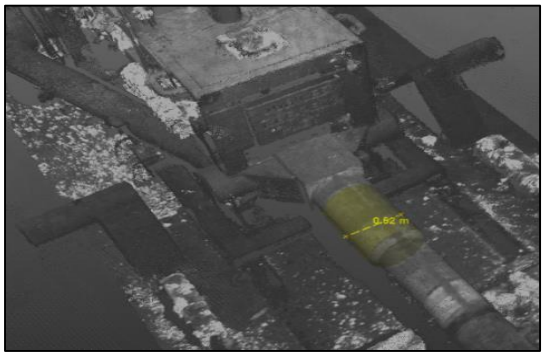
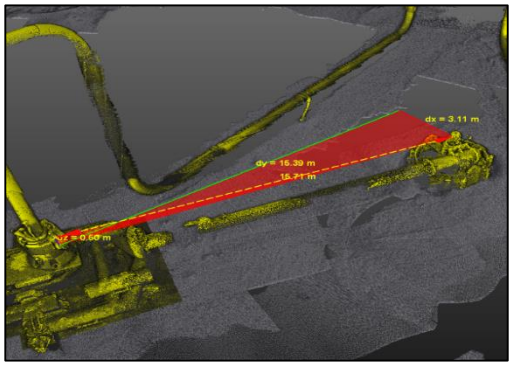
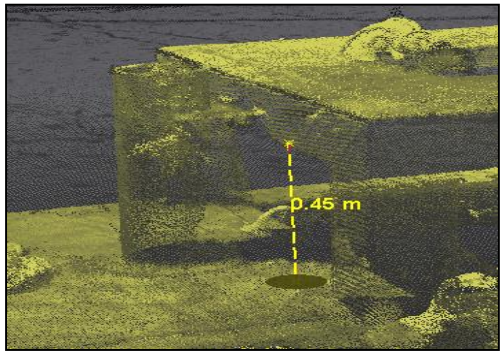


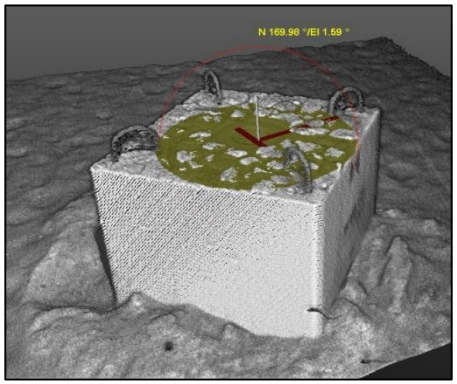
Diameter measurement

Distance



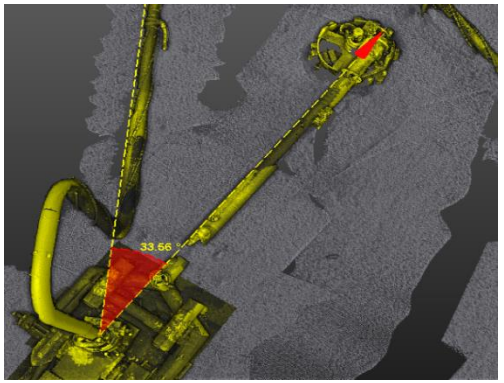


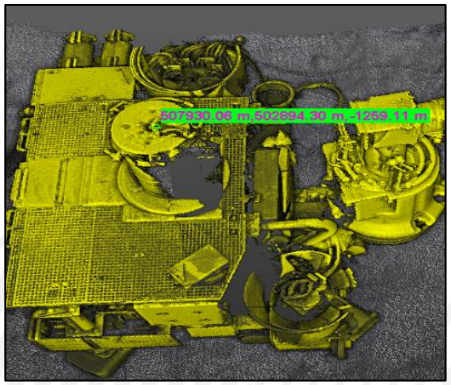
Clearance measurement



Best Fit Plane Inclination measurement

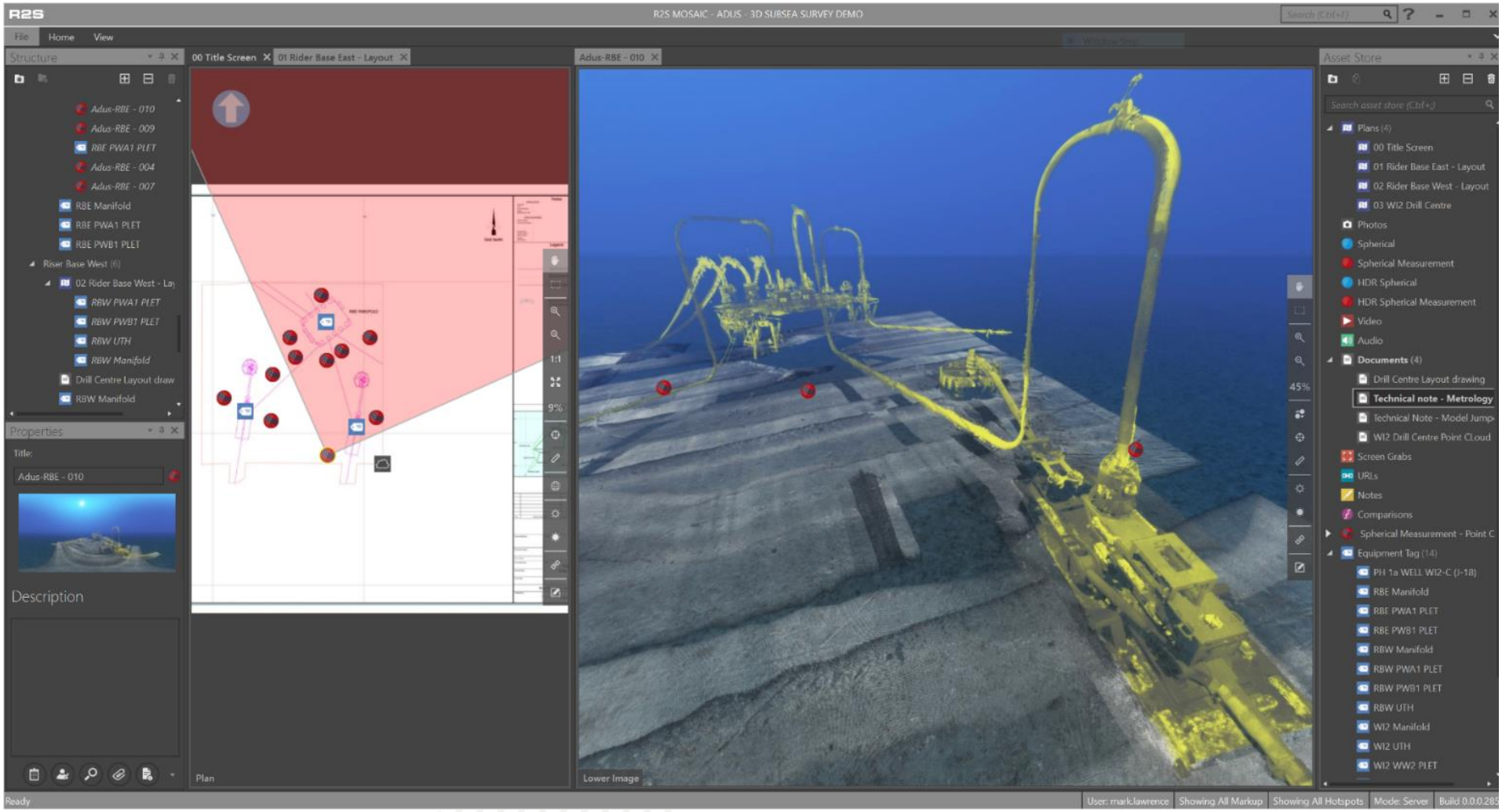
Angular



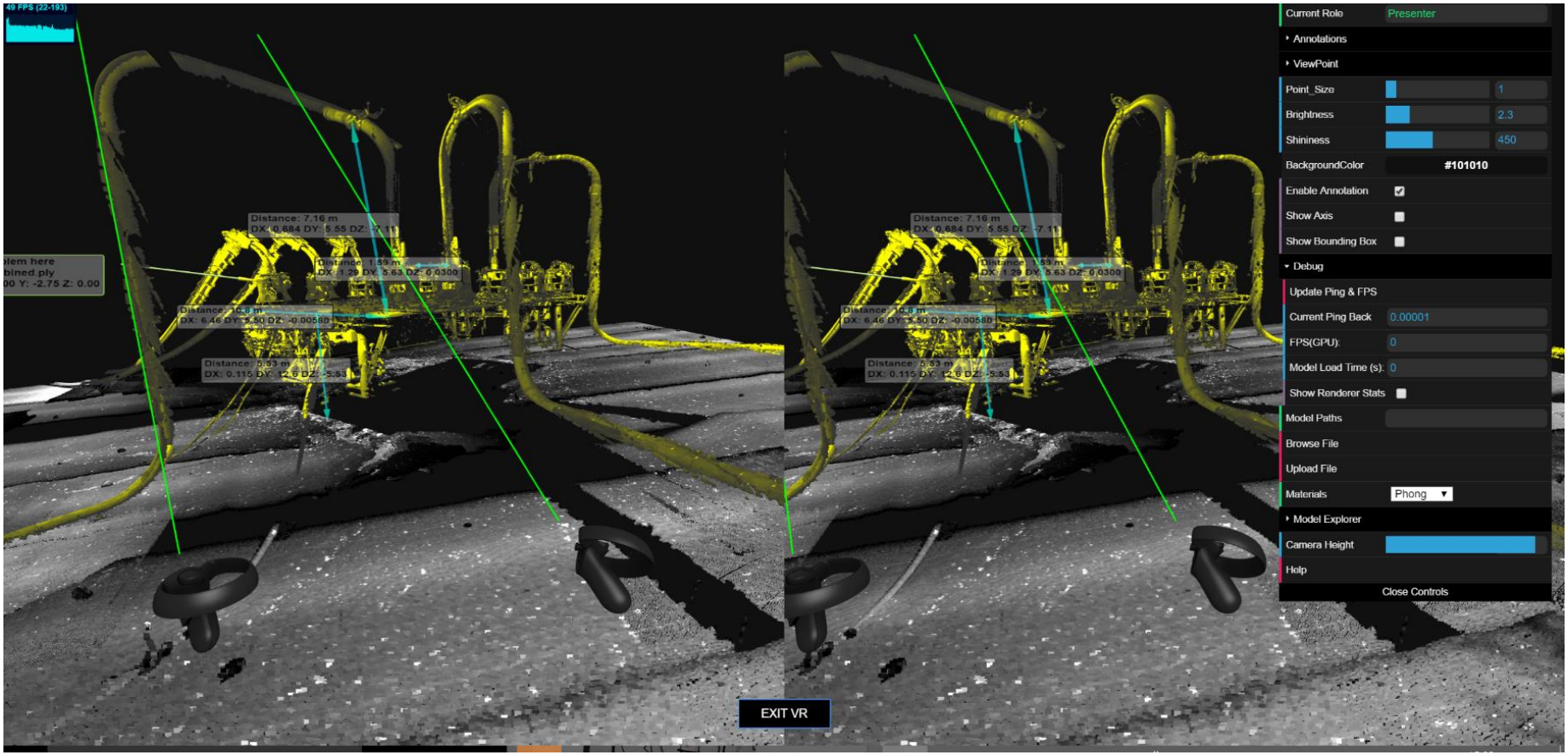


Coordinates

Virtual reality - Visual Asset Management



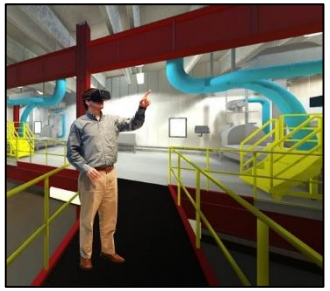
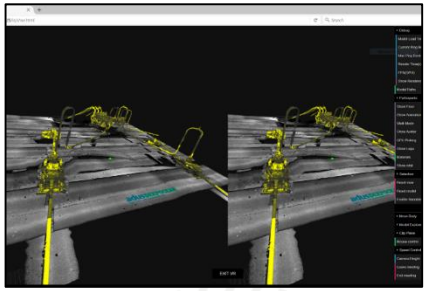
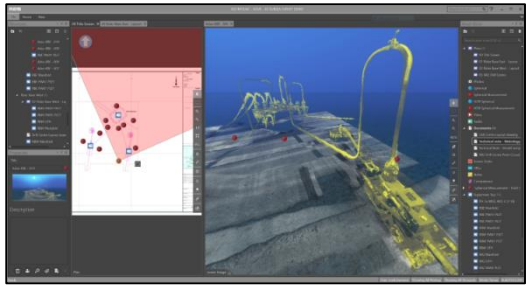
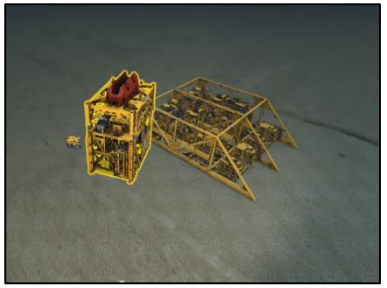
Collaborative Web VR



Virtual Reality

When 3D laser data is combined with emerging visualisation technology such as Virtual Reality and Augmented Reality, there is a paradigm shift in the way we can view and understand the character & nature of assets subsea. We are currently only scratching the surface of what this 3D data can provide in terms of information & risk mitigation for our clients. Potential areas for use of Virtual Reality using metrical 3D laser data include:

- Virtual prototyping in preparation for subsea interventions;
- Virtual operational simulations to reduce risks during actual operations;
- Virtual inspection;
- Providing a basis for remote operations in the future;
- Improving contextual awareness & efficiency of ROV pilots;
- Enhanced visual asset management;
- Improving client communication: collaborative virtual reality meetings viewing datasets at 1:1 scale.

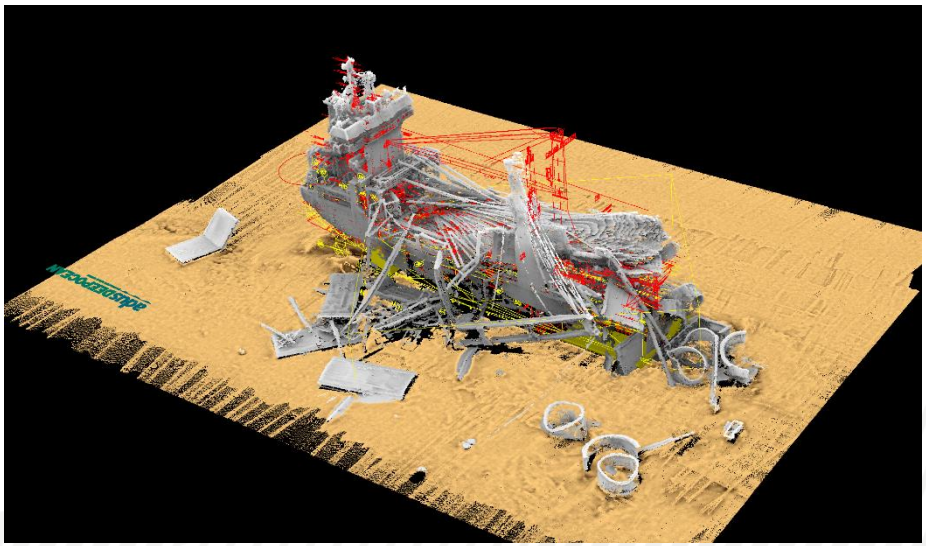





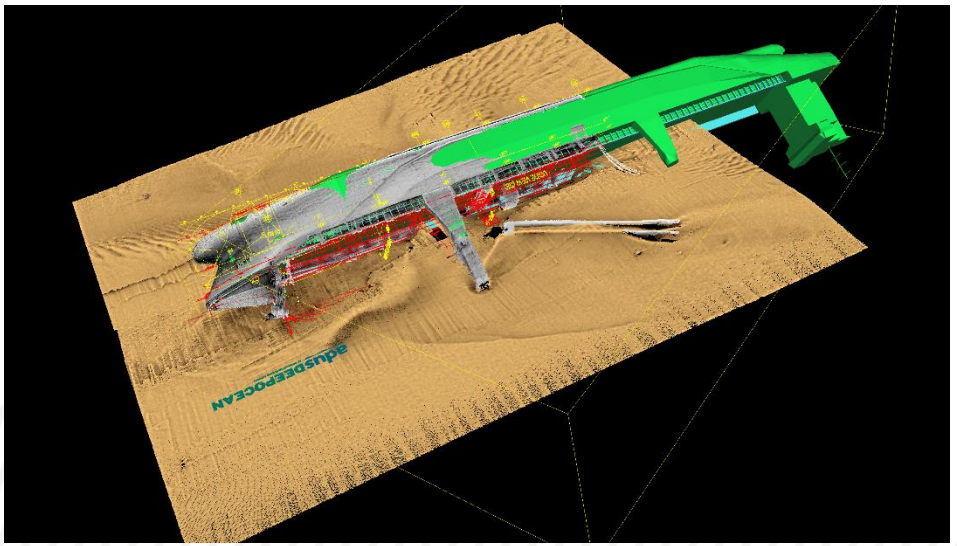
WHAT IS THE BENEFIT?

- Better Planning
- Less non-productive time offshore – more efficient operations
- Lower cost for subsea decommissioning

Other Benefits

- Reverse Engineering – Inspection Maintenance and Repair ahead of CoP and decommissioning
- Subsea Model for prosperity and for comparison with final as-left survey results





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