Autonomous & digital solutions for the North Sea

by Frank Ruhs, 21 November 2019

Content

Fugro at a glance

World's leading Geo-data specialist, **collecting** and **analysing** comprehensive **information about the Earth and the structures** built upon it.

Through integrated **data acquisition**, **analysis** and **advice**, we unlock insights from Geo-data to help our clients design, build and operate their assets in a safe, sustainable and efficient manner.

Marine Site Characterisation

- Geophysical service
- Geotechnical services
- Metocean surveys
- Environmental services
- Hydrographic services
- Marine geoconsulting

Marine Asset Integrity

- Positioning & construction support
- Infrastructure solutions
- Maintenance & decommissioning services
- IRM services

Our way of working

Aquisition

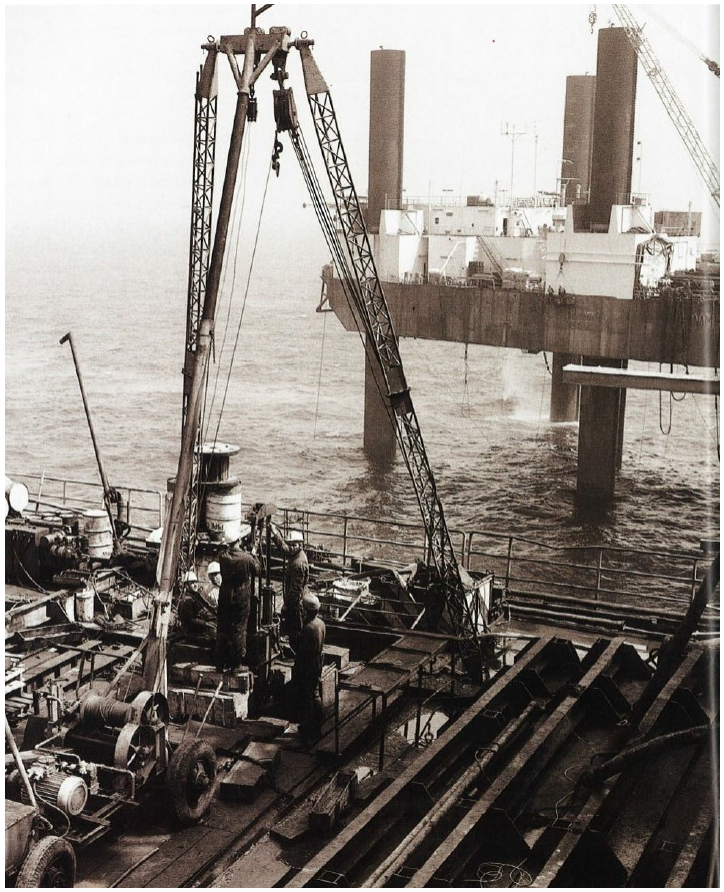
Marine acquisition:
- 40 vessel
- 30 jack-up platforms
- 18 offshore drill rigs
- 125 ROVs
- 5 AUVs
- 2 USVs

Analysis

Data Analysis & reporting
- >8.000 specialists
- 40 laboratories
- 4 remote service centers
- 3 remote Operations Centers
- > 55 years of experience
- Collaboration with top universities

Advice

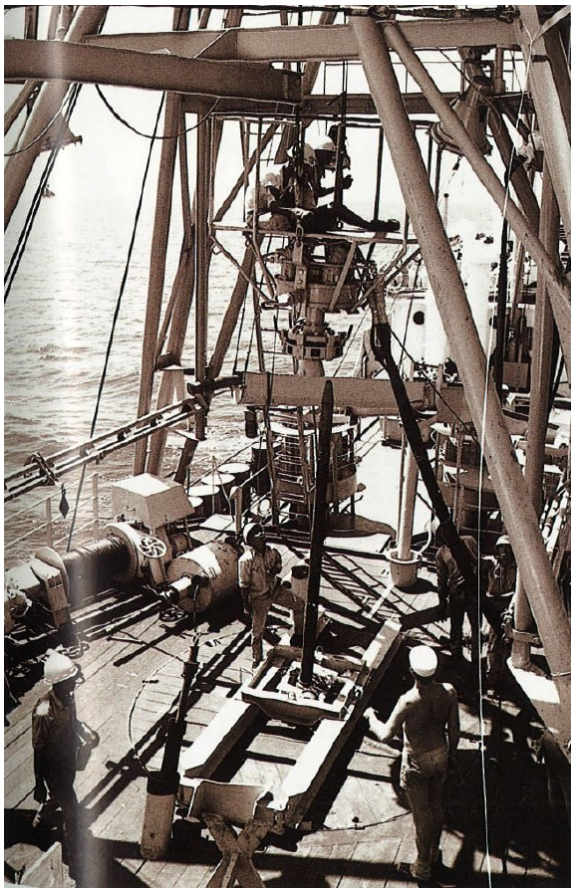
Past versus present



Fugro's first CPT at sea, the Leman Bank (1968)

Fugro SEACALF MKIV – continuous drive (2018)

Past versus present

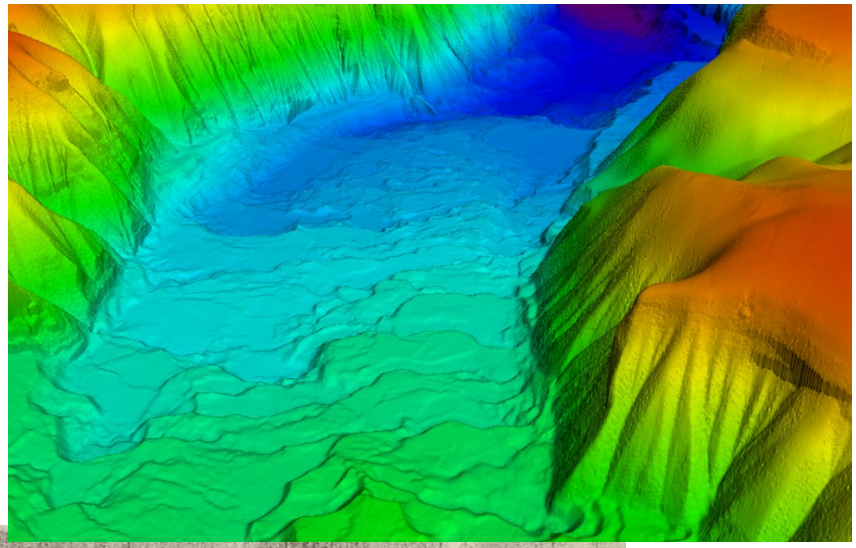


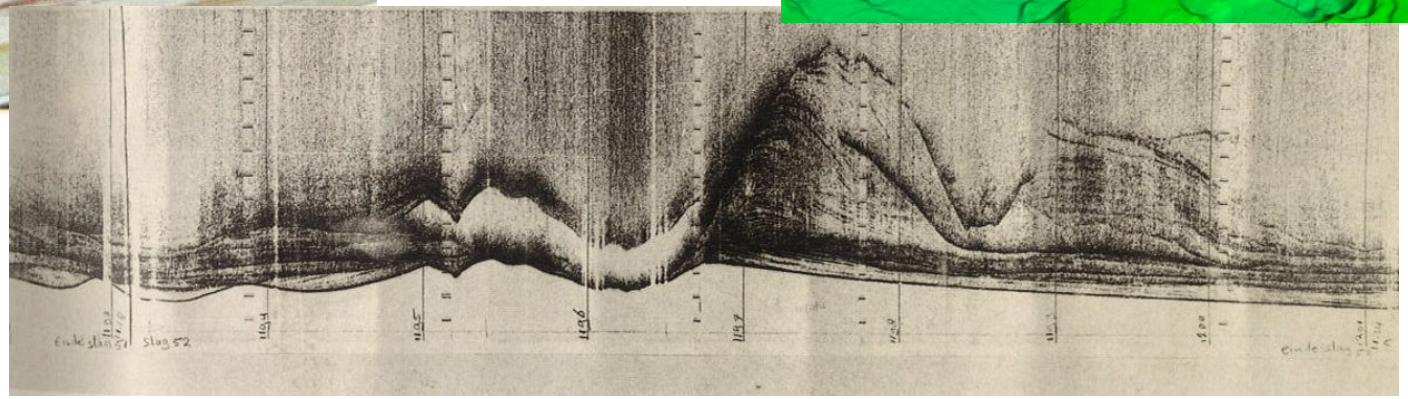
Drill-rig onboard the MV Pelatuk (1976) – Saudi Arabia

Drill-rig onboard the Fugro Scout (2017) – Rotterdam

Past versus present

Multibeam data acquired by the Fugro Pioneer (2018) – Capbreton Canyon France





Acoustic data acquired by the 'Sonia' (1976)

Strategy

for tomorrow

Digital

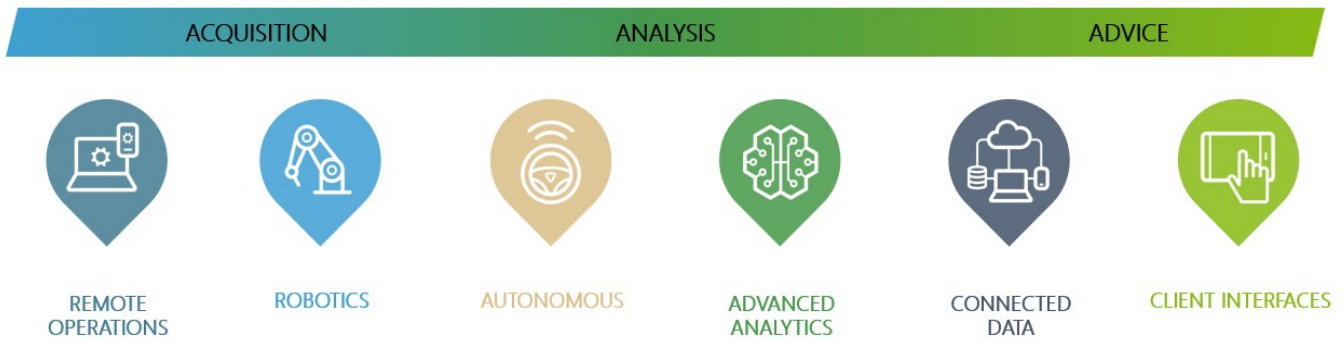
Digitally transforming Fugro

Transforming the way we work

Integrated

Fugro Digital Foundation

Transforming our relationship with our clients



Resulting in differentiating value propositions

Strategy

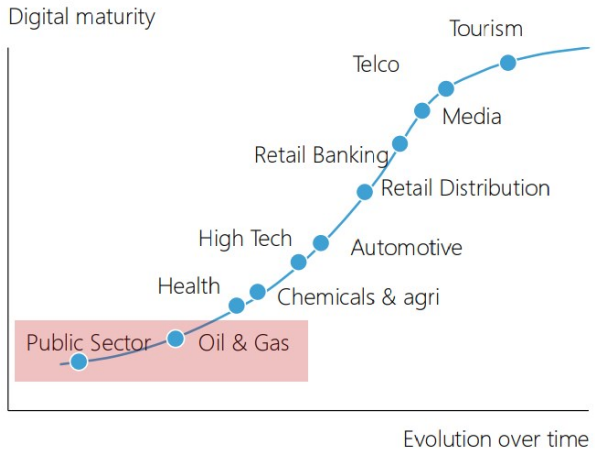
for tomorrow

So what has changed?

A new wave of Digital Innovation is fundamentally changing the way value is created and captured.

Digital comes first

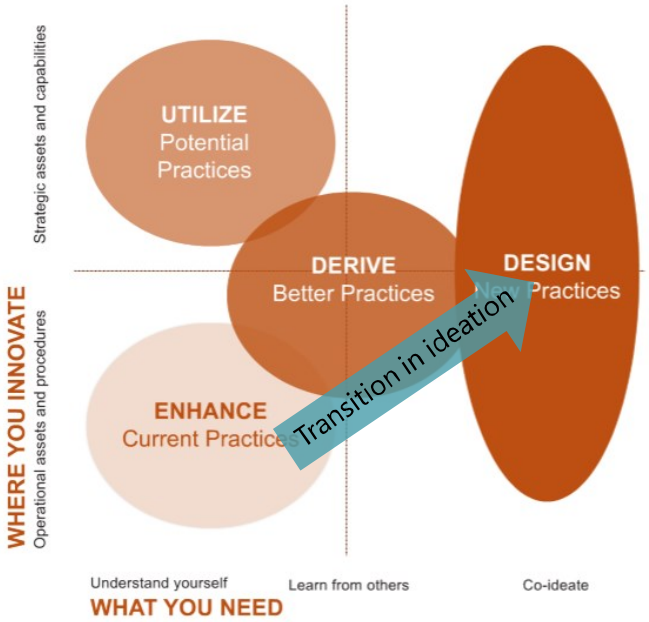
Digital objects become the primary resource for value creation; instead of being representations of physical/analogous resources.



Source: mckinsey.com

Transition between industries

Innovation in digital-native companies carries over to traditional industries; enabling a different approach towards the ideation process of innovation.



Source: Systematic ideation - prof. dr. J. Recker

Impacting innovation process

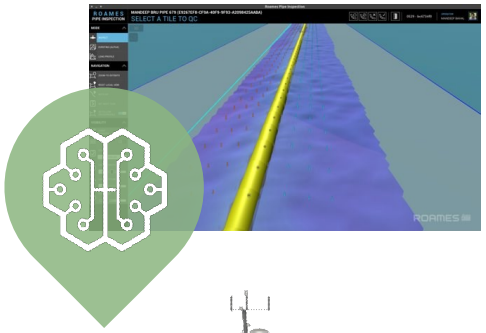
- Different skillset among personnel
- Increased No. of contractors
- Align with customers more actively
- Engage business more actively

Innovations

that are changing the way we work

ROAMES

Real-time & predictive (asset) analytics



USV (FAS900)

First generation unmanned survey vessels

ACQUISITION ANALYSIS ADVICE

ROC

Remote Operations Centre

FUGRO

FAS900 (USV)

Fugro Autonomous Surveyor 900

>20%

Operational efficiencies

>30%

Faster delivery

Designed for utilisation in the **hydrographic** industry.

Primarily for **broad area mapping of the seabed.**

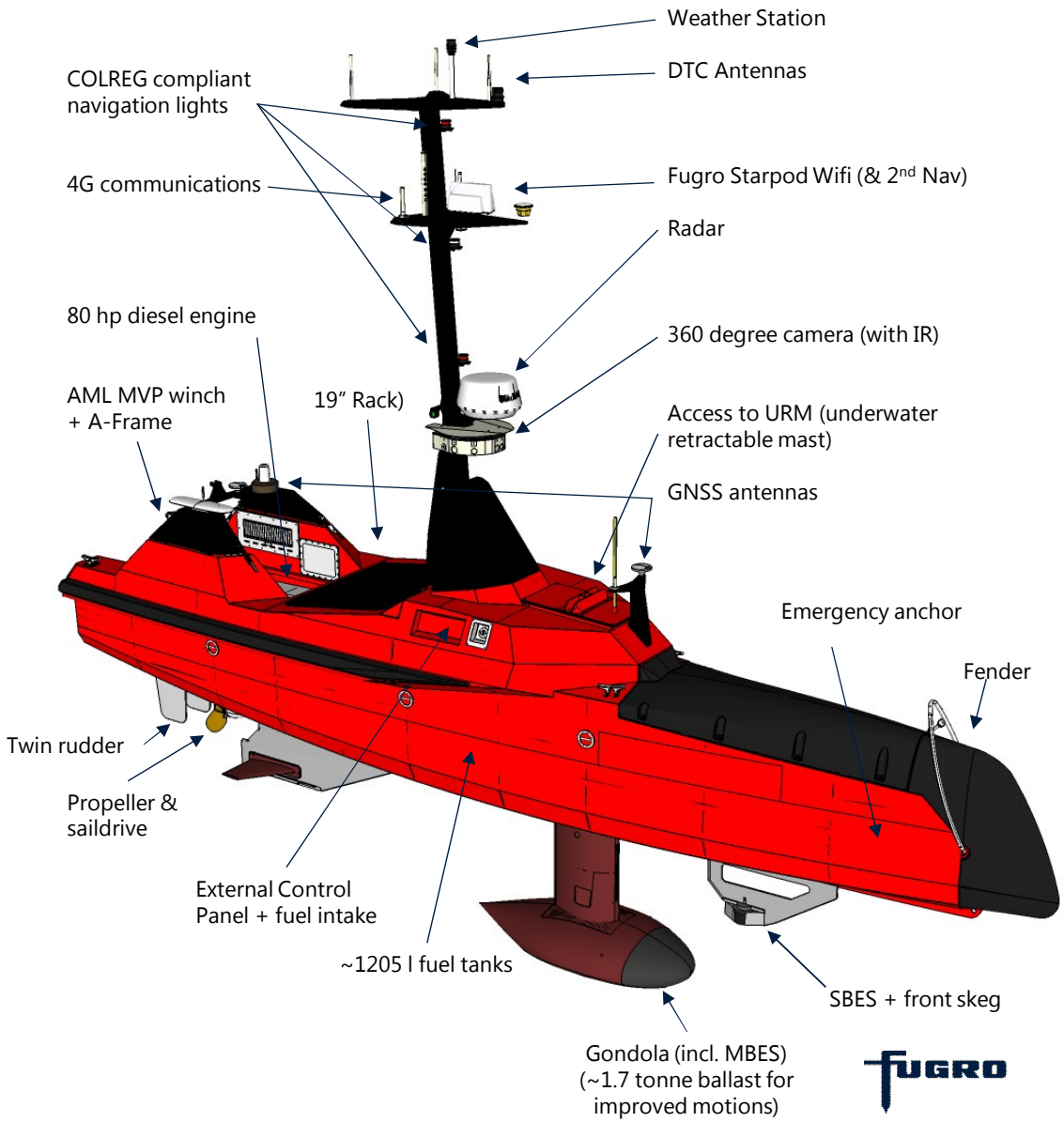
(Client) benefits:

- **Faster collection** of **high data quality**;
- **Reduces HSSE exposure** through minimised offshore staffing;
- Provides sustainable operation through significantly **reduced fuel consumption** and carbon footprint.

FAS900

Vehicle Instrumentation

Survey Equipment	
Multi Beam Echo Sounder (MBES)	Dual Head Kongsberg EM2040-04 Mk II
Echo Sounder (SBES)	Teledyne Echotrack E20
Positioning	GNSS with Fugro G4+
Motion Reference Unit	MGC-R3 (within Kongsberg Seapath 380-R3)
Sound Velocity Profiler	AML MVP30 (on winch)
Sound Velocity (@ head)	Valeport UV-SVP
Navigation Package	Fugro Starfix Suite
Communications	▪ WiFi ▪ DTC (Long Range, LOS) ▪ 4G

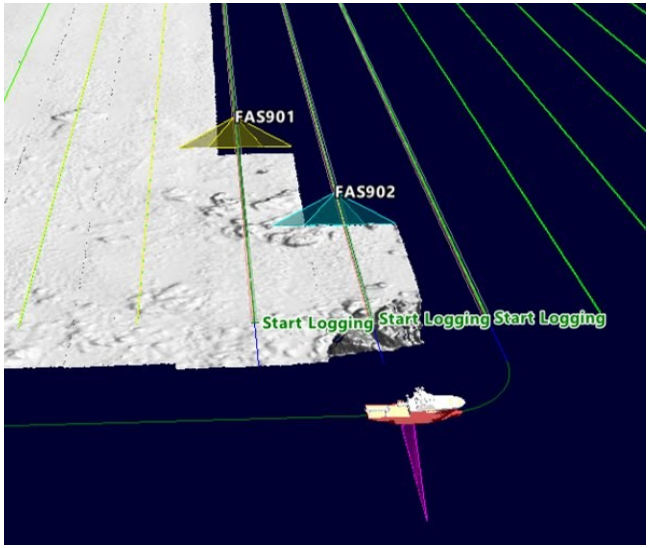


FAS900

Operational scenarios

3 operational scenarios:

- **Mother – Daughter set-up**
- ‘Hotel’ Support Vessel
- Stand Alone / Over the Horizon Operations *(under development)*

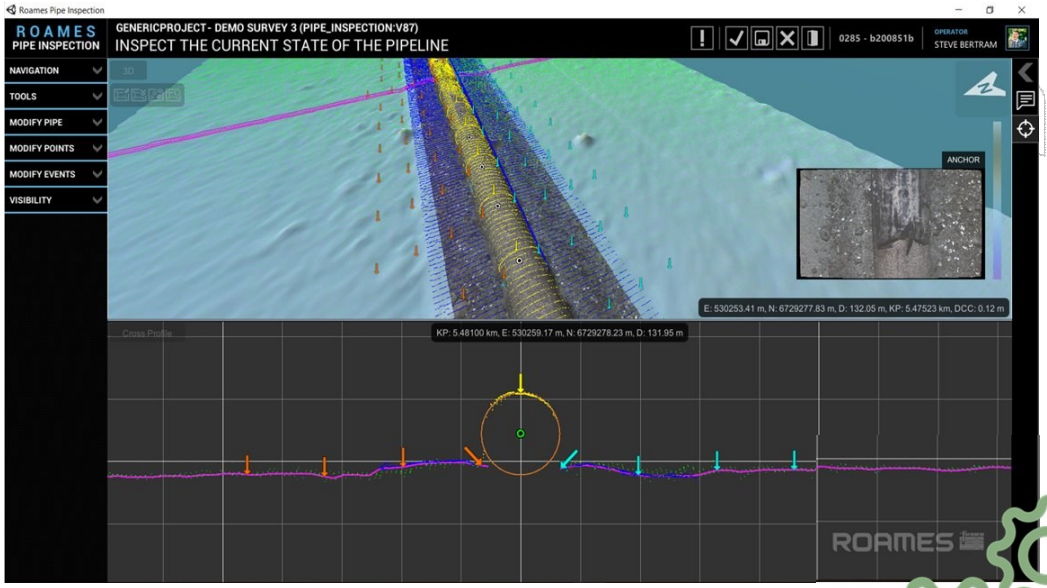


- Multiple vessels can **share their online coverage** with each other;
- Multiple terrains can be **merged locally into a master terrain**, maintaining full statistics for SD, Hit Count, etc.;
- **AutoSwath included**, providing dynamic route calculations.

ROAMS

Cloud-based pipeline inspection

3D simulation of real world environments to monitor your infrastructure condition and optimise performance.



OPEX reduction up to **40%**

Efficiency: From **weeks to hours**

(Client) benefits:

- **Real-time** and **predictive;**
- **Cloud-based analytics** provide an accurate, frequently updated 3D network model;
- Direct analysis of **compliance** to client key business rules.

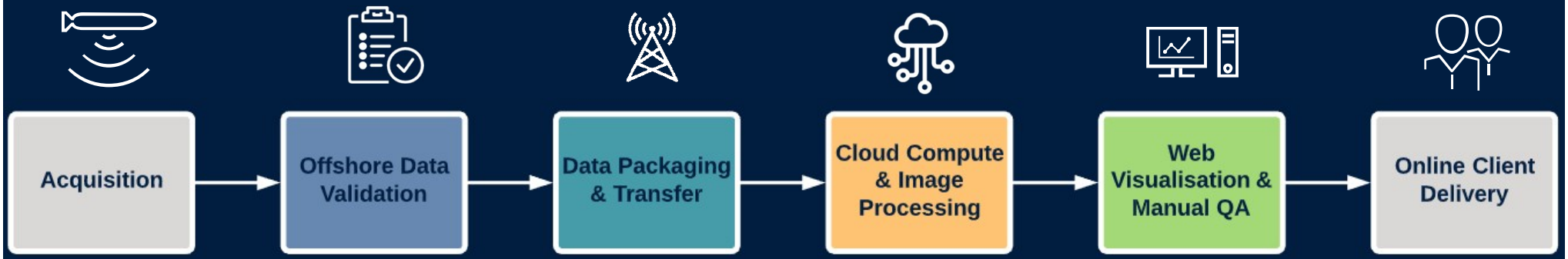
ROAMS

The why and how

Why?

- AUV and Fast ROV acquisition **speeds are four times faster** than traditional methods.
- Point cloud **data is seven times more dense** than traditional sensors.
- Acquiring more data, quicker, makes **vessel-based processing unmanageable.**

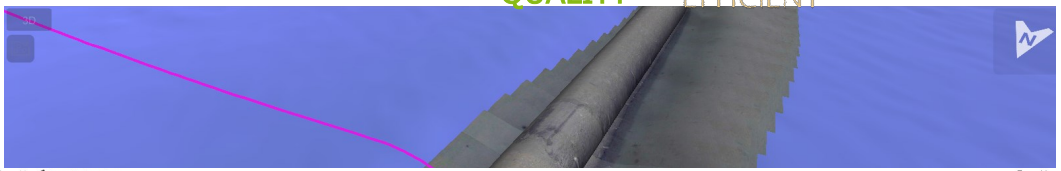
How?

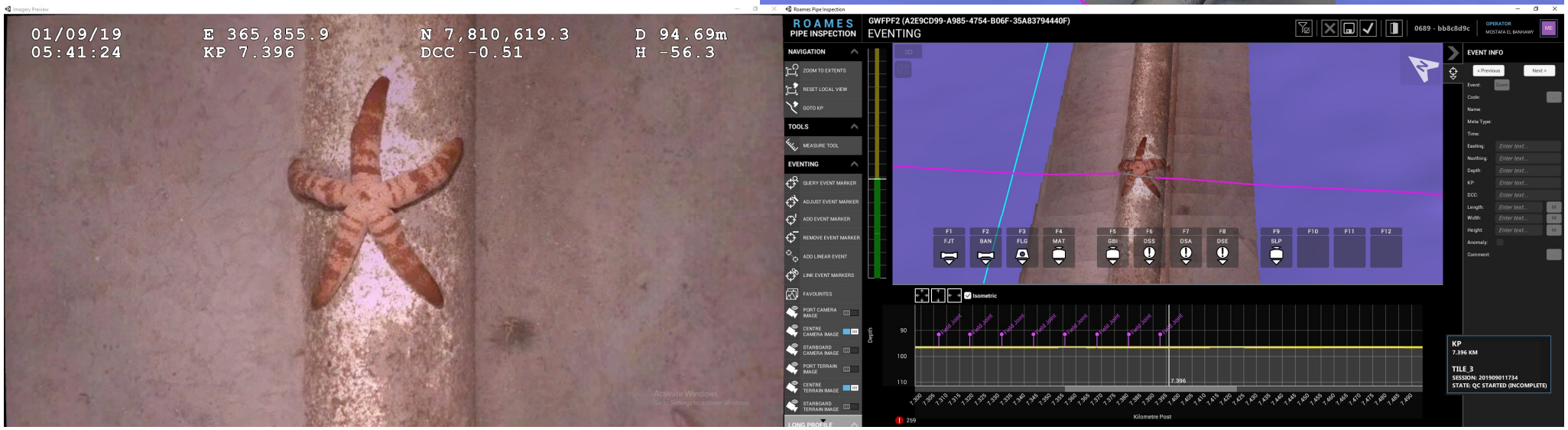


ROAMS

Near-real time image processing

- Superior **alignment between images** over the native software solutions.



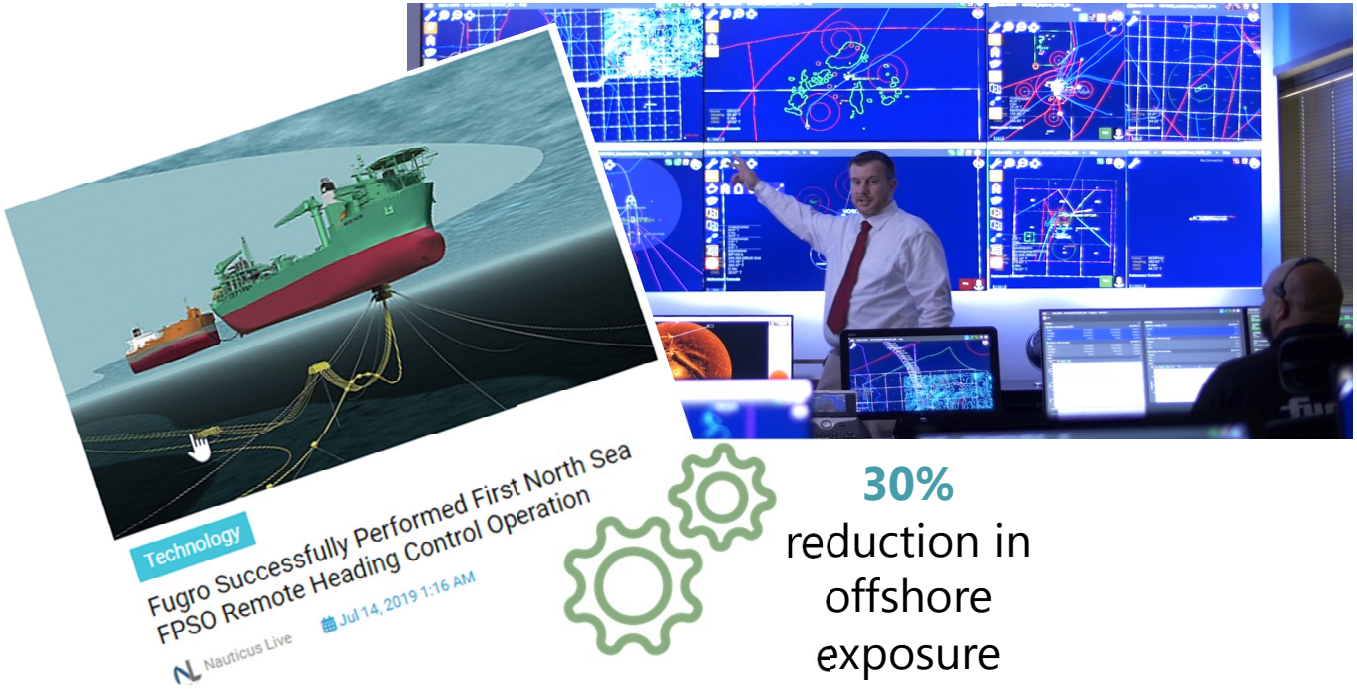


ROC

Remote Operations Centre

"If your job is to look at a screen, and only look at a screen, you should be doing so from onshore"

– Gordon Kennedy, Director Marine Asset Integrity Europe and Africa



30% reduction in offshore exposure

(Client) benefits:

- **Operational flexibility** as it enables professionals to concentrate on those things that matter;
- **Real-time decision making** due to direct access to data;
- **Improved safety exposure** by moving people out of the offshore environment (HSSE).

ROC

and its capabilities

Data processing

Remote survey/
Vessel monitoring

Pipeline inspection

ROV piloting

Status of ROC integration

- **Remote monitoring** in service since 2015 and covered over 150.000 hours of positioning support (24/7 global OARS);
- **Remote inspection and data processing** (ROAMS) succesfully launched and operated for multiple clients in 2018 and 2019;
- **Remote UXO ID&C** support currently being tested in collaboration with some of our clients;
- **USV over the horizon** operations being prepared for Q1 2020.

ROC

Global coverage for Remote Operations

Summary

our impact on North Sea operations

- We persue the same objective with R&D like we did over the past 57 years; creating a more **safe**, **efficient**, **sustainable** & **reliable** service.
- It is the way we innovate that has changed; **digital objects** have become the **primary resource for value creation**

  → innovation is no longer the sole domain of experts!
- This requires the company (& industry) to **change**; the way it **innovates**, the way it **operates** & the way it **recruits and educates.**
- **Autonomous and digital solutions** are the focus for Fugro in the years to come.

"We cannot solve our problems with the same thinking we used when we created them"

- Albert Einstein

Thank you

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