A 3D Optical solution to Navigation

Michael Flynn

Introduction

Cathx Ocean Founded in 2009

Subsea Imaging and Machine Vision company

Speaker: Michael Flynn CTO & Co Founder

Industry Challenge

No Automation

Path to Efficiency

Reduce ship time through speed

Automate ROV task

Long endurance AUV

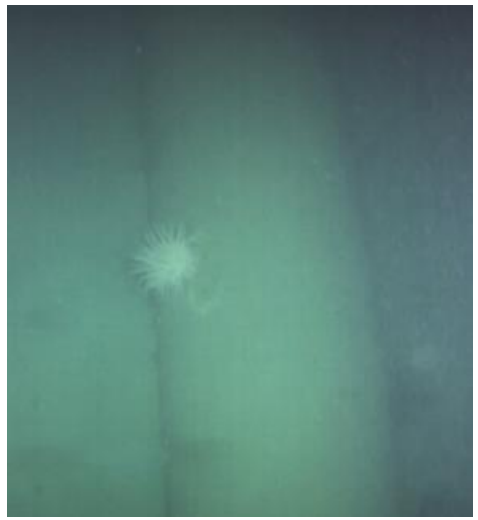
Resident Vehicle

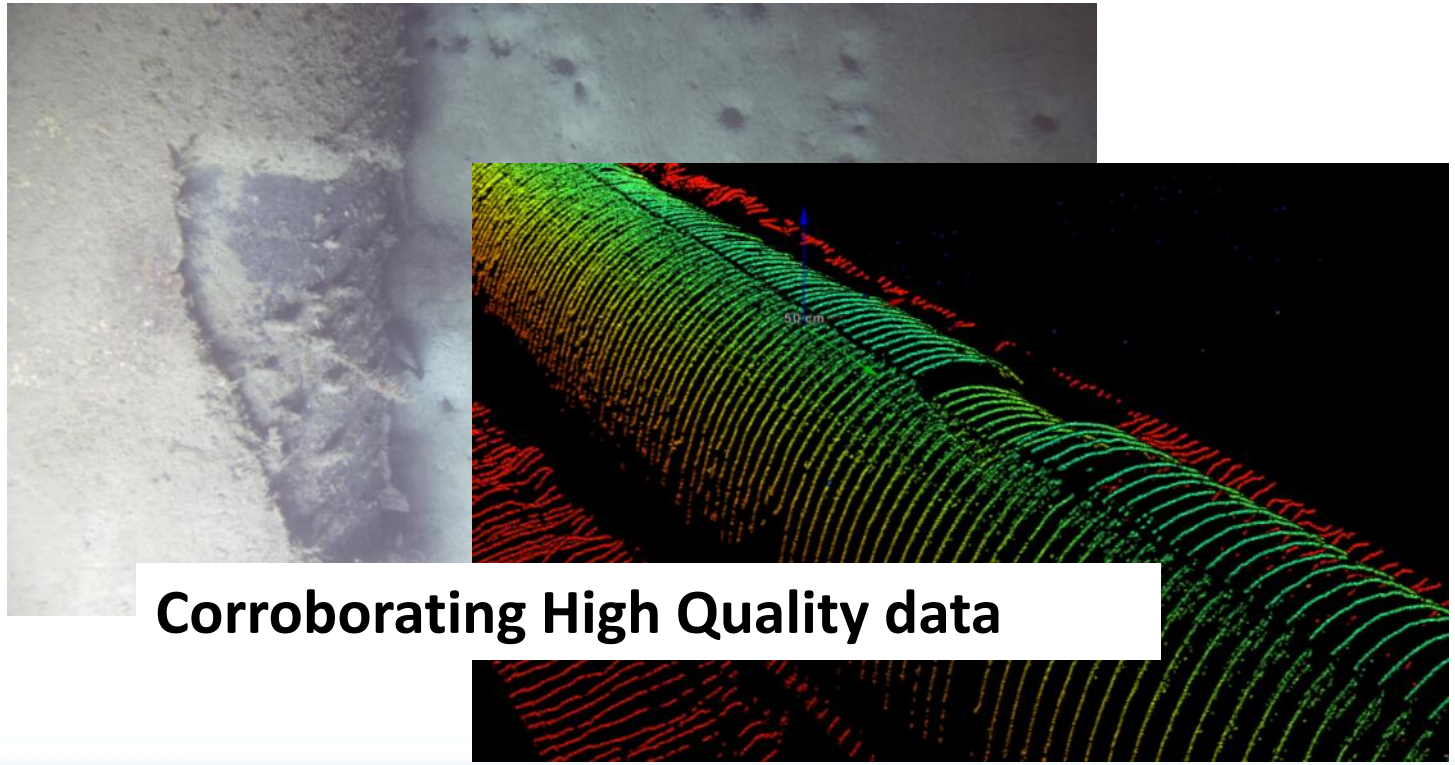
Automate the processing of data

Automation

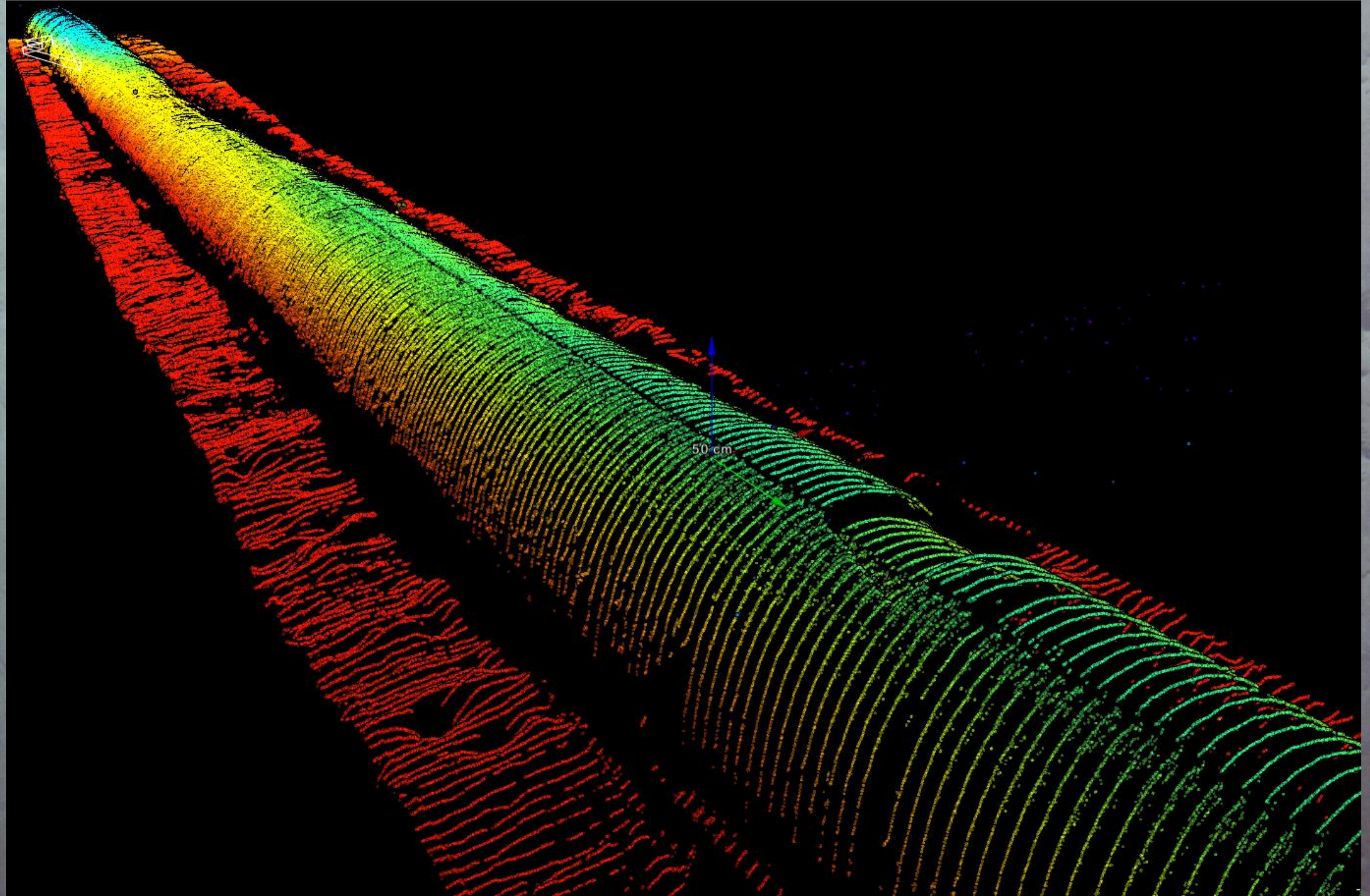
Automation need to be reliable and trusted.

Automation starts with Data Quality





Corroborating High Quality data


50 cm

Data Automation

Data Acquisition

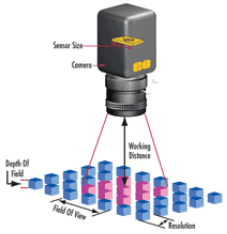
- Stills
- Laser 3-D
- Measurement
- Navigation
- Meta data

Machine Vision 'Applications'

- Pipe Tracking
- Freespan detection
- Ovality Measurement
- Object detection
- Change Detection
- Image based Navigation
- 2-D Mosaics
- 3-D Photogrammetry

…

Using Shape detection & Geometric analysis

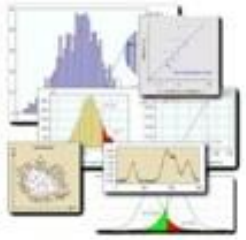


Data Management

- Object Store – Images & meta data
- Machine Vision Libraries & 'Applications'
- Survey results – Events, Anomalies
- Tiered Storage -> Cost effective
- Cloud and/or data centre Services

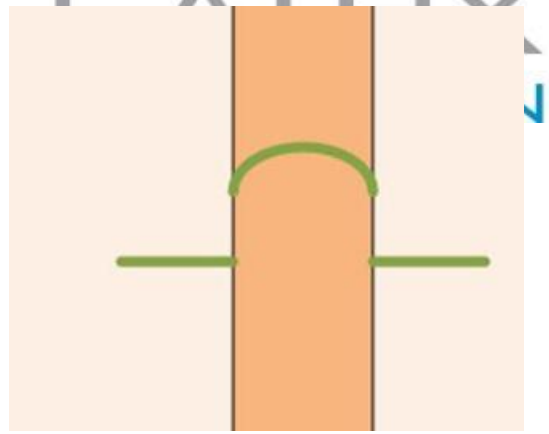
Business Intelligence (Analysis & Visualization)

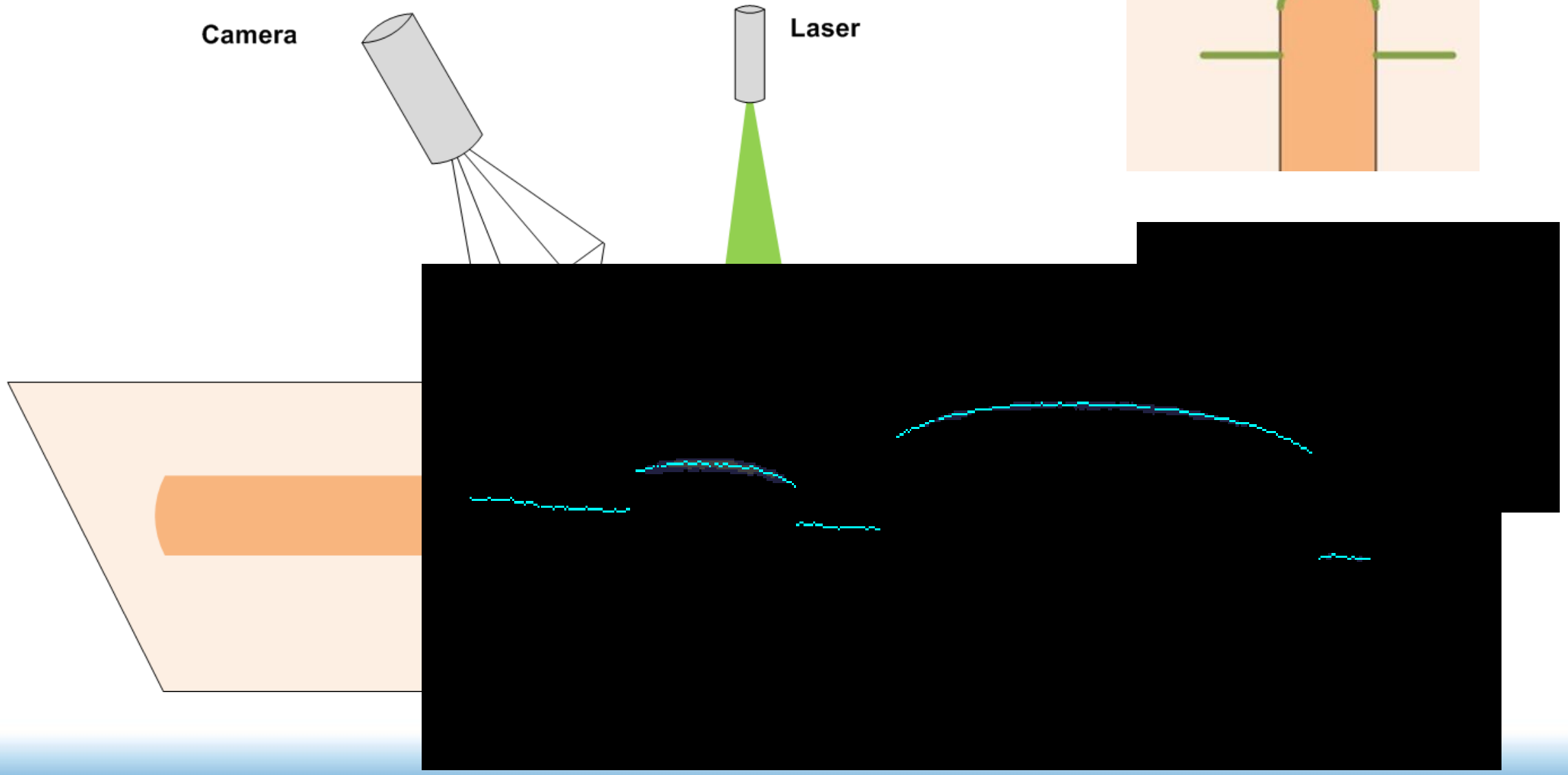
- Integrity Management
- Survey Results
- Survey Analysis
- Survey Comparisons
- Trends/Changes
- Map Viewer
- GIS integration
- Application performance
- KPIs

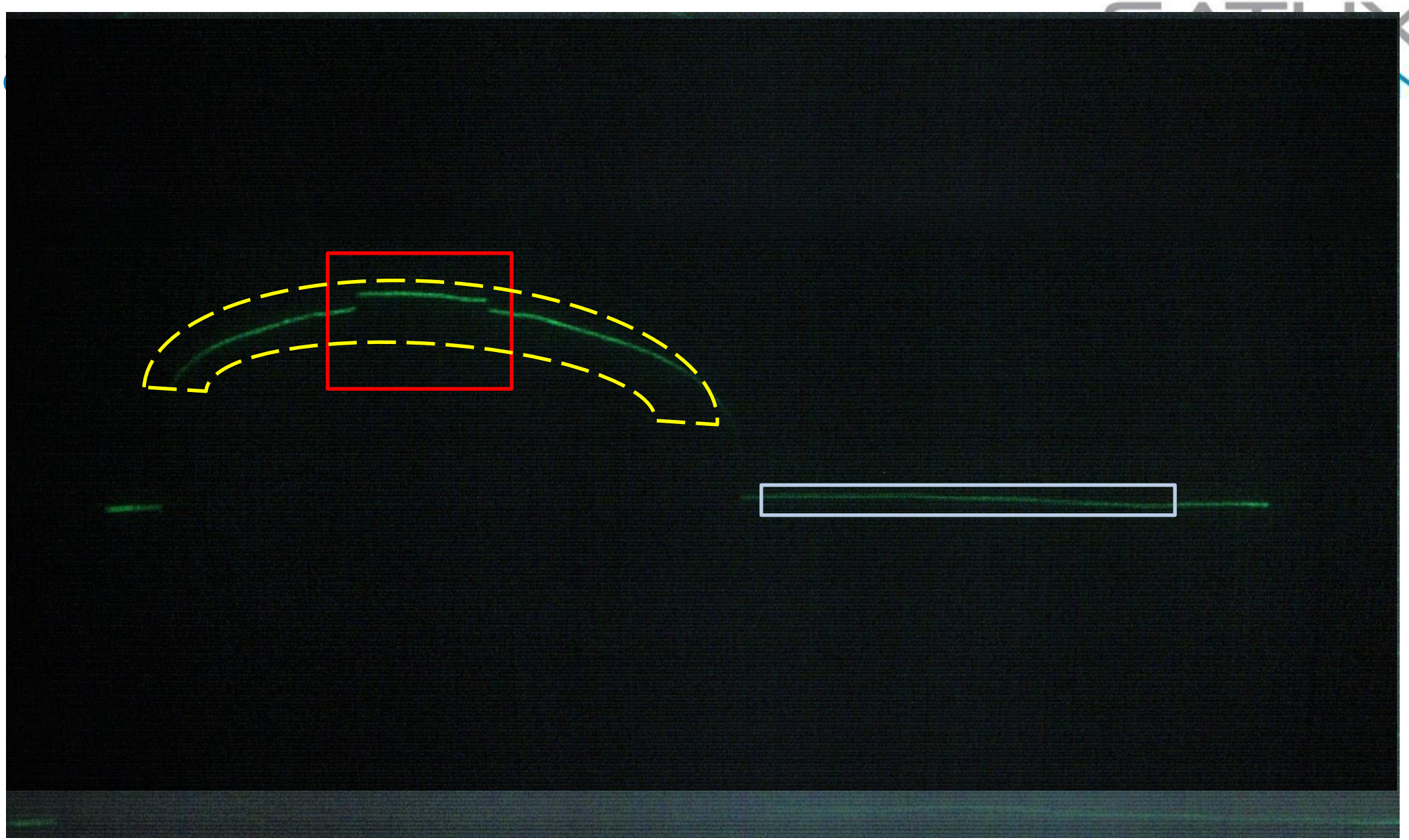


3D Laser

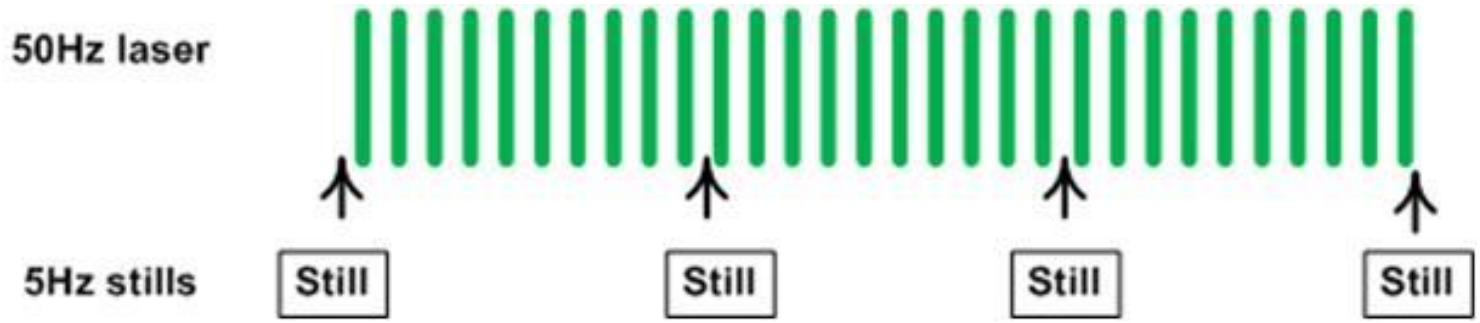
What is 3D Laser





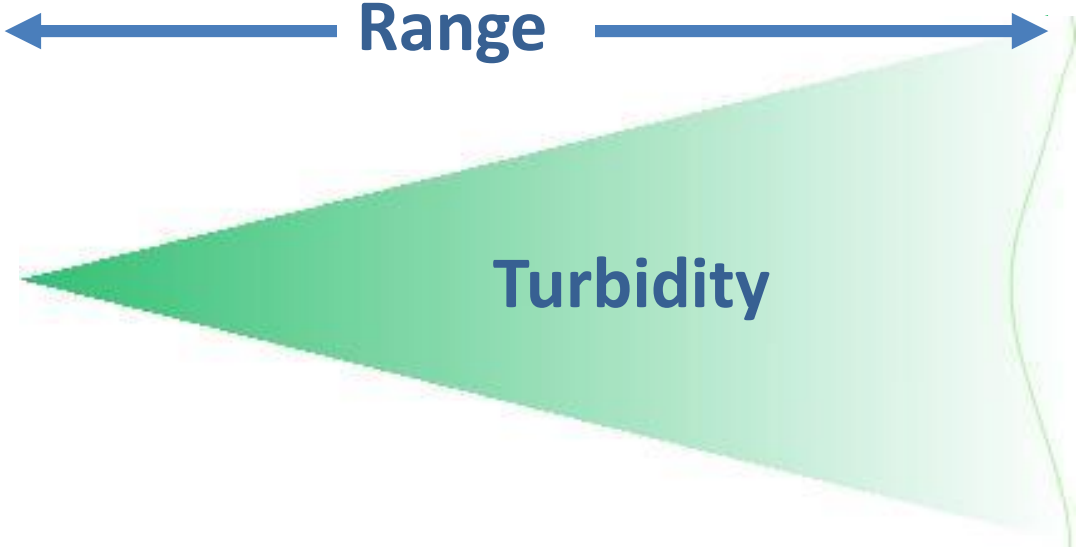


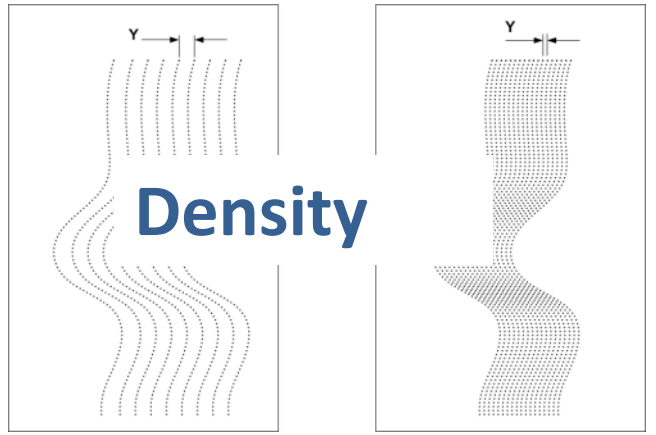
How we capture it



We call it Sequential imaging

Laser challenges





Positioning

Accuracy & Resolution

Up to 2m laser system local resolution <1mm in X,Y&Z

At 5m laser system local resolution is <2mm in X,Y&Z

Using conventional methods this high local resolution might be placed inches out of position.

The positioning challenge

Mooring Chain inspection

Infield 3D Survey

Out of straightness

Metrology

Damage survey

Hull Inspection

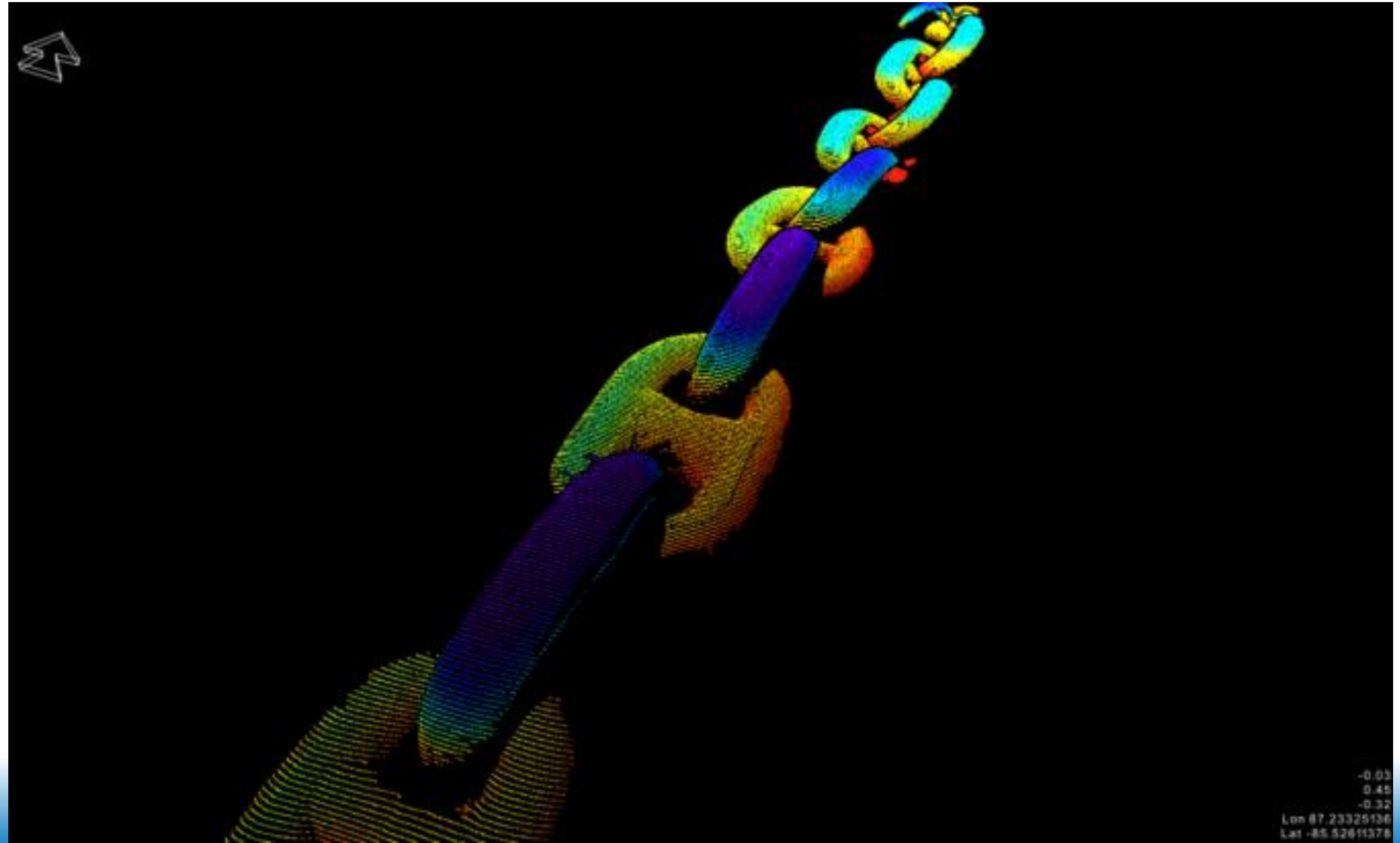
Observation class ROV survey

Riser Inspection

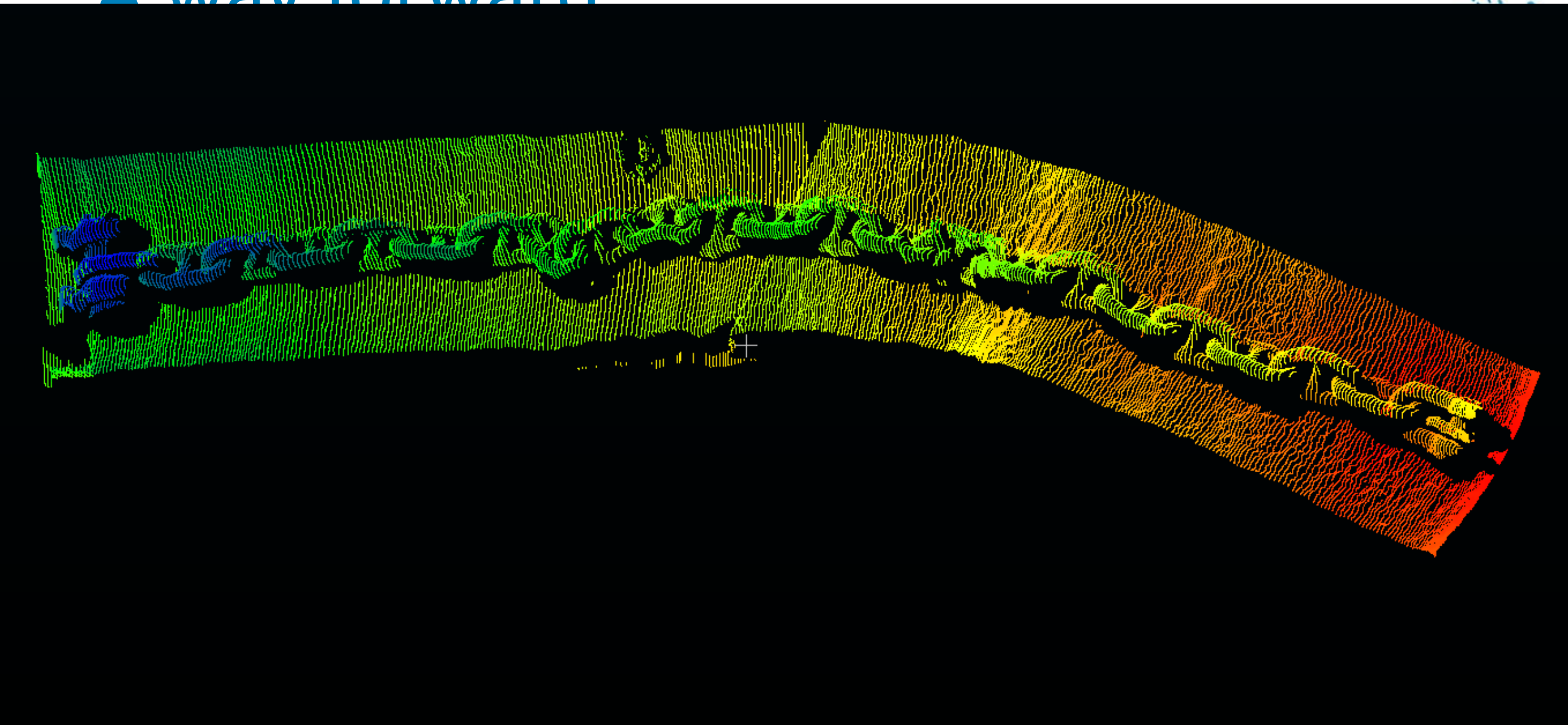
Tunnel/in-pipe inspection

A way forward

CATHX OCEAN

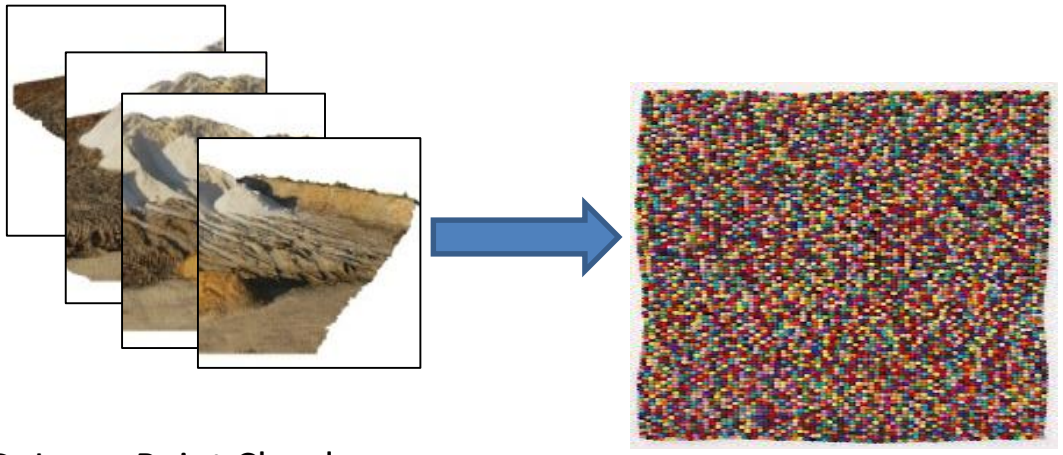


A way forward



Full Colour 3D Laser

UHD Stills



3-D Laser Point Cloud

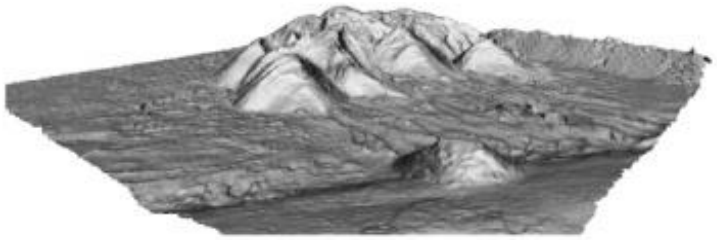


Image processing
Using proprietary
real time techniques

Full Colour 3-D Laser Point Cloud

- Much Faster than photogrammetry
- More reliable across multiple surfaces
- Standard formats
  - x,y,z, RGB
  - Range, Bearing, Tilt, RGB

Challenges

- **Calibration & Accuracy**
  - Well under way at present.

- **Full Automation**
  - QC as you acquire..
  - Dynamic Machine Vision based imaging
  - Too late in the office

- **Go Real-time**
  - Optimise solution for modern HW

Vs Traditional Navigation

+ Potentially much more accurate

- Doesn't know where it is on the planet..local/relative position only

- Can be used in tandem to clean traditional navigation

- Can be used instead where only local accuracy counts

The Future

Accuracy

- Metrology level inspection

-Completely non contact target less inspection

-Measurement on the fly for operational efficiency

Speed

-SLAM (Simultaneous Location and Mapping)

- ROV Control & Automation

- Resident Vehicle enabling technology

Thank You!

For more information please contact :

Michael Flynn
Email: mflynn@cathxocean.com
Phone: +353 45 252786