From Cities to Coastlines: crafting Digital Twins from the Air

Stephen Cooper, Global ABS Sales Director, Hexagon

Andy Waddington, VP Bathymetric Services, Hexagon

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Steve Cooper

Global ABS Sales Director,
Hexagon

Andy Waddington

VP Bathymetric Services,
Hexagon

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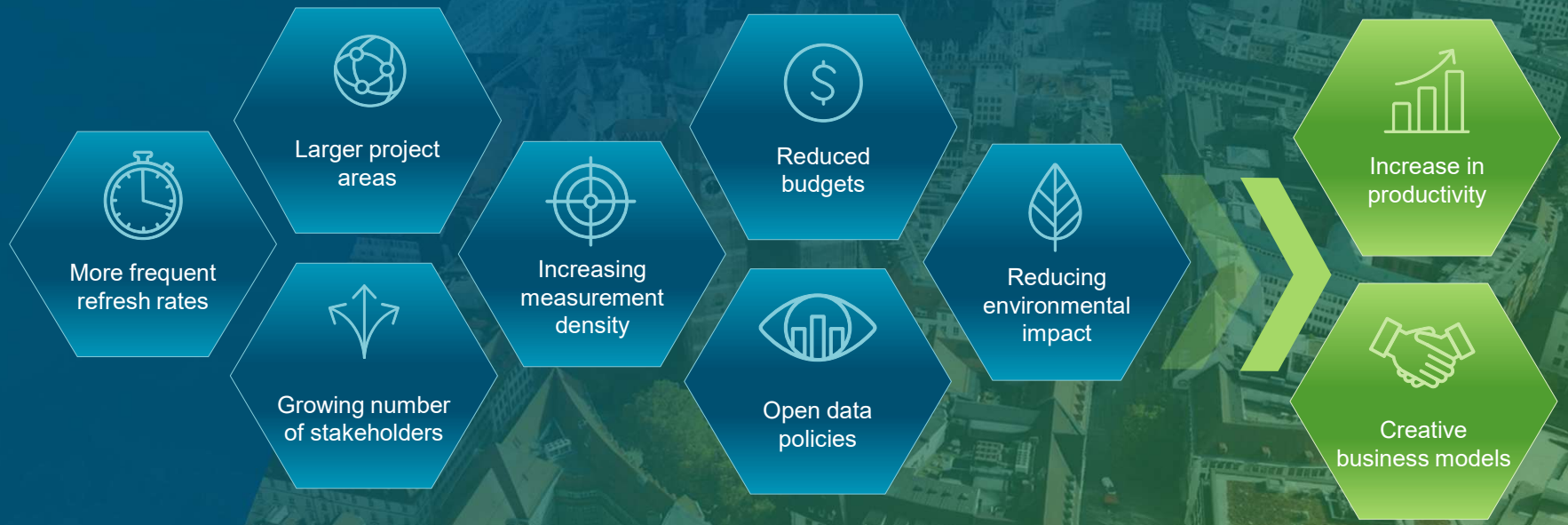
Geospatial Industry Trends

Current and emerging observations and response



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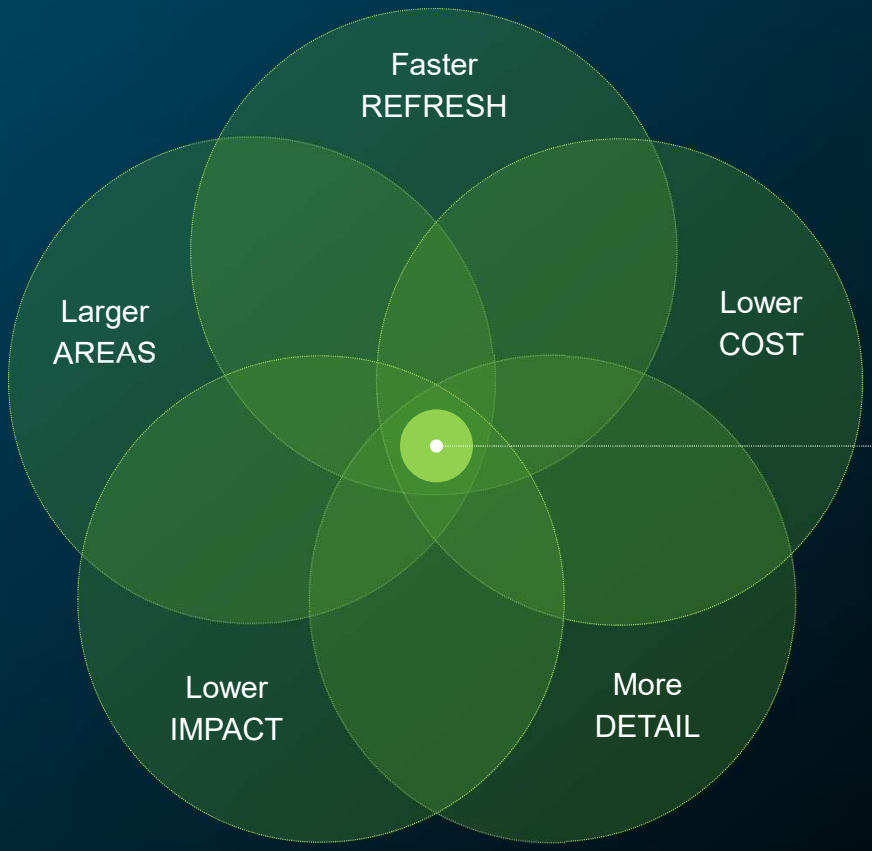
The Hybrid Paradigm: The need to achieve higher efficiency



Our Focus

- Efficient Capture
- Efficient Processing
- Easy Accessibility for Everyone

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Geospatial Content Solutions (GCS) Core capabilities

AIRBORNE

Sensing Technology

Researching, developing, producing and distributing cutting-edge airborne imaging, LiDAR and hybrid sensors and data processing software to provide customers with higher data capture efficiency and more data from every flight.

Increase in productivity

MAPPING

Services

Providing data acquisition and processing services to selected, strategic Hexagon customers and partners to expand their capacities to serve their clients and local markets.

Creative business models

CONTENT

Capture & Distribution

Capturing and distributing high-resolution airborne data, including orthophotos, elevation data, 3D models and analytics as a service to provide customers with immediate access to geospatial information.

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History of Mapping

100 years of Aerial Acquisition

Analog Era
1923 - 2000

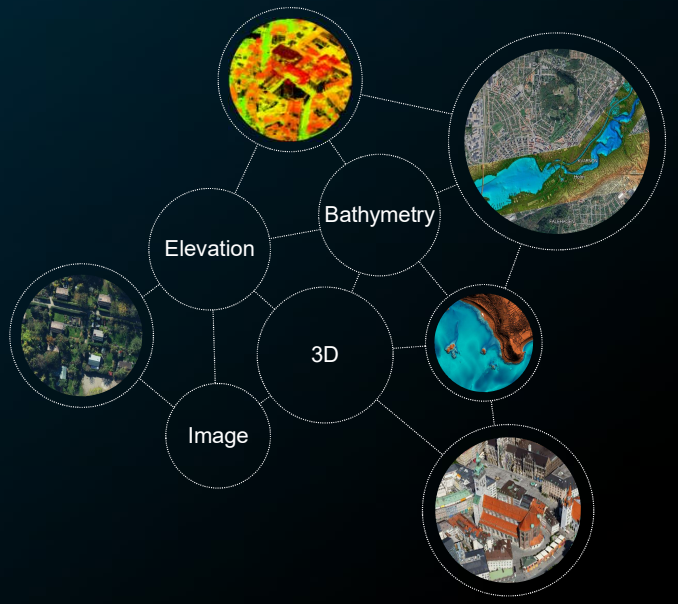
Digital Era
2000-2016

Hybrid Era
2016 - Today

Integrated Workflow- Leica Geosystems Advantage

High-performance, integrated workflow solution supporting multiple inputs and multiple products

Leica Workflow



Hybrid Sensors

One Workflow

Unlimited number of Data Products

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Leica Geosystems

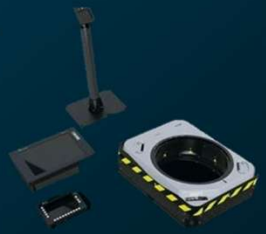
Modular components - Fit for purpose sensors

Integrated Hybrid
Components

Topo LiDAR:
Hyperion

Imaging:
MFC

Bathy LiDAR:
Theia



Peripherals

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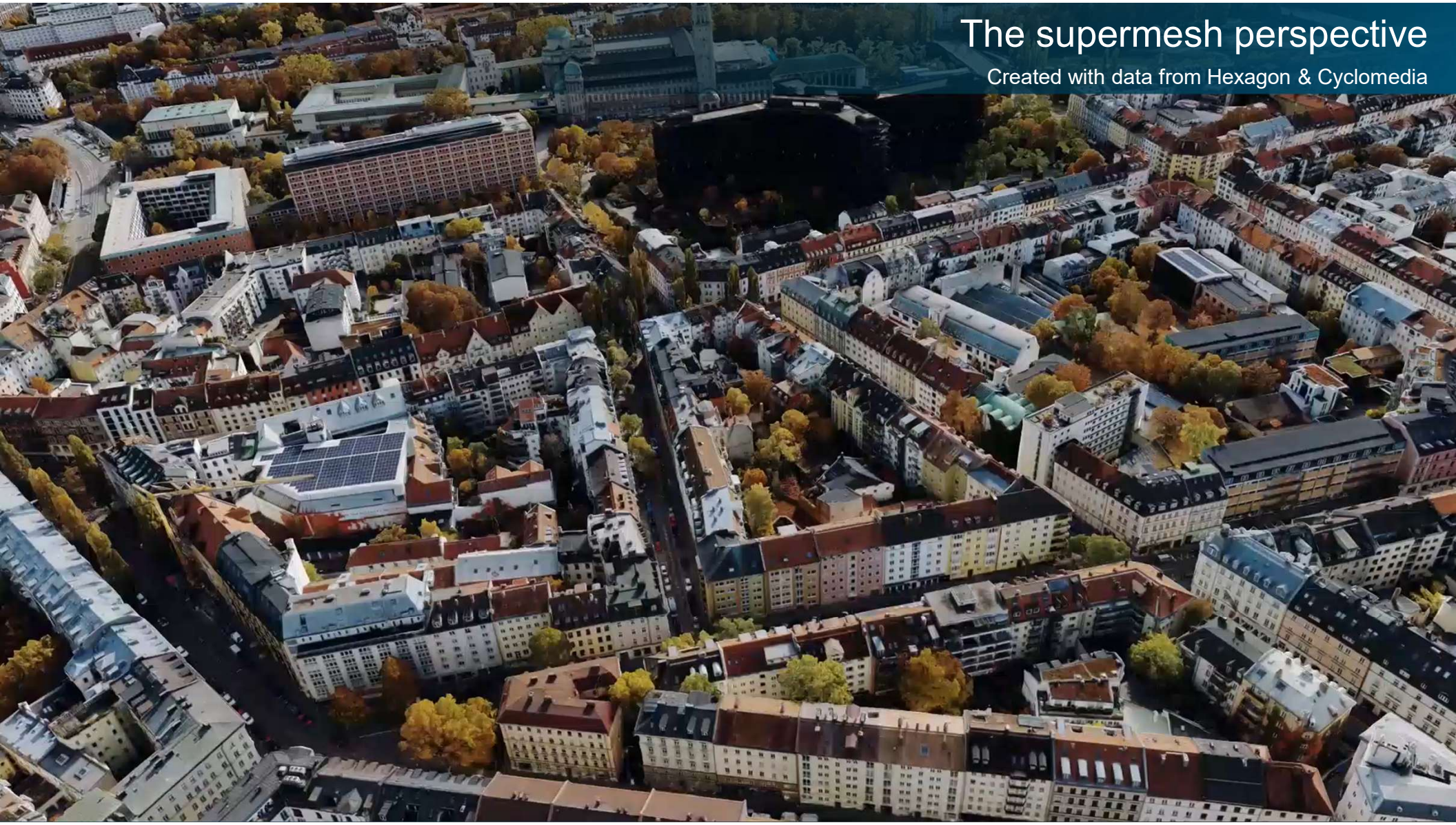
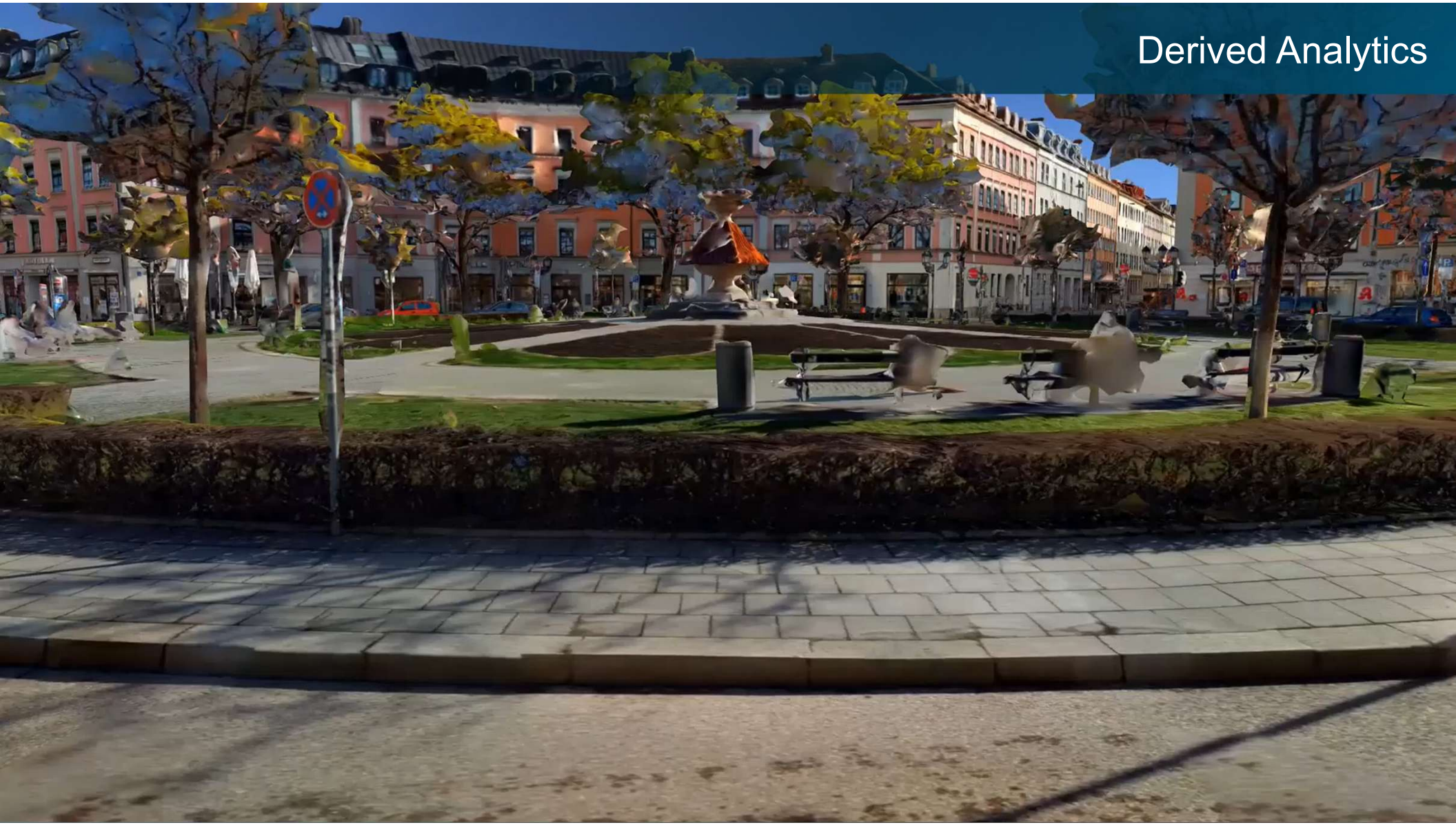
Digital Twins:
trends and applications

The supermesh perspective

Created with data from Hexagon & Cyclomedia



Derived Analytics



Planning

Simulations

Major Developments | Nottingham City Council

Nottingham City Council

Search by Name

Sort by name

1 Brook Street

Residential
On site/Under Construction
21/00968/PFUL3

117 Canal Street

Residential
Pre-app/Planning guidance

123 Huntingdon Street

Residential
Complete
18/00449/PFUL3

1-4 Queens Road Phase 1

Residential
On site/Under Construction
22/00593/PFUL3

149-169 Lower Parliment Street

Residential
On site/Under Construction
18/02624/PFUL3

15 Traffic Street

Residential
On site/Under Construction
21/01004/PFUL3

Source: Airbus,USGS,NGA,NASA,CGIAR,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community | Maxar, Microsoft

Powered by Esri

Digital Twins for the coastline

Urgent priorities

AIR

Decarbonization

LAND

Deforestation

Biodiversity

WATER

Plastics

Oceans

Water Crises

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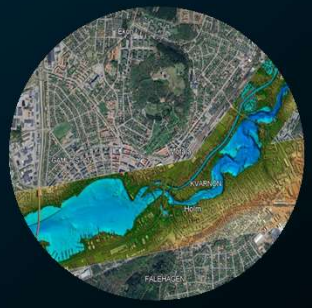
Why would you want a digital twin of a coastline?

Coastal Geomorphology

Erosion Monitoring

Flooding and Water Ingress



Resource Extraction

Infrastructure Management

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MC1

Slide nummer 18

MC1 [@WADDINGTON Andy] is this the clip you need for your presentation? Should I remove overlay text?
MAURI Cristina; 2025-04-02T08:59:02.570

WA1 0 This is perfect. Please remove the text from 00:22 (Leica Coastal Mapper) onwards
WADDINGTON Andy; 2025-04-02T09:22:22.797

MC1 1 Video now updated [@WADDINGTON Andy]
MAURI Cristina; 2025-04-03T06:51:57.189

MC1

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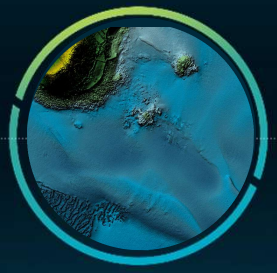

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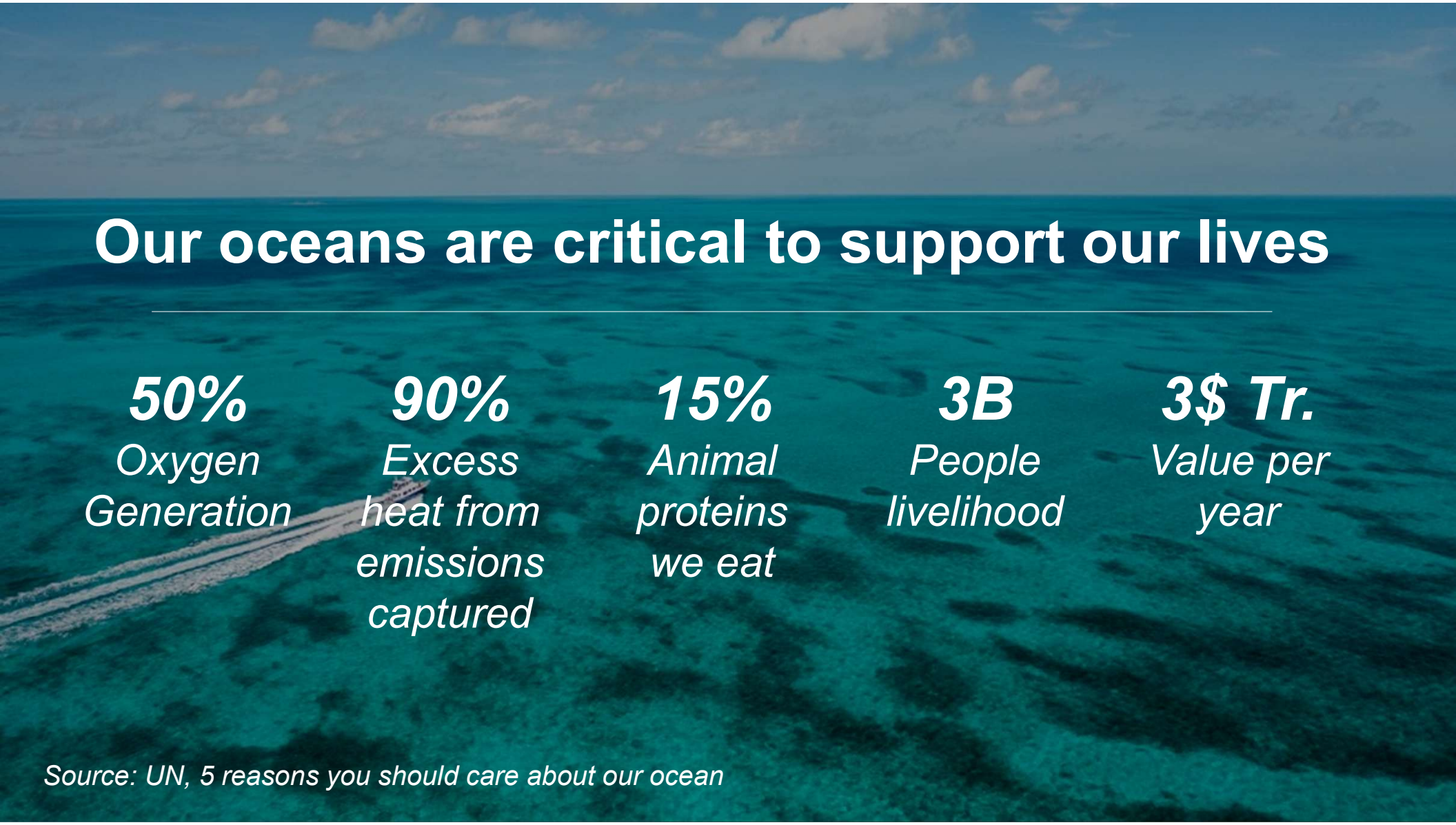
Slide nummer 19

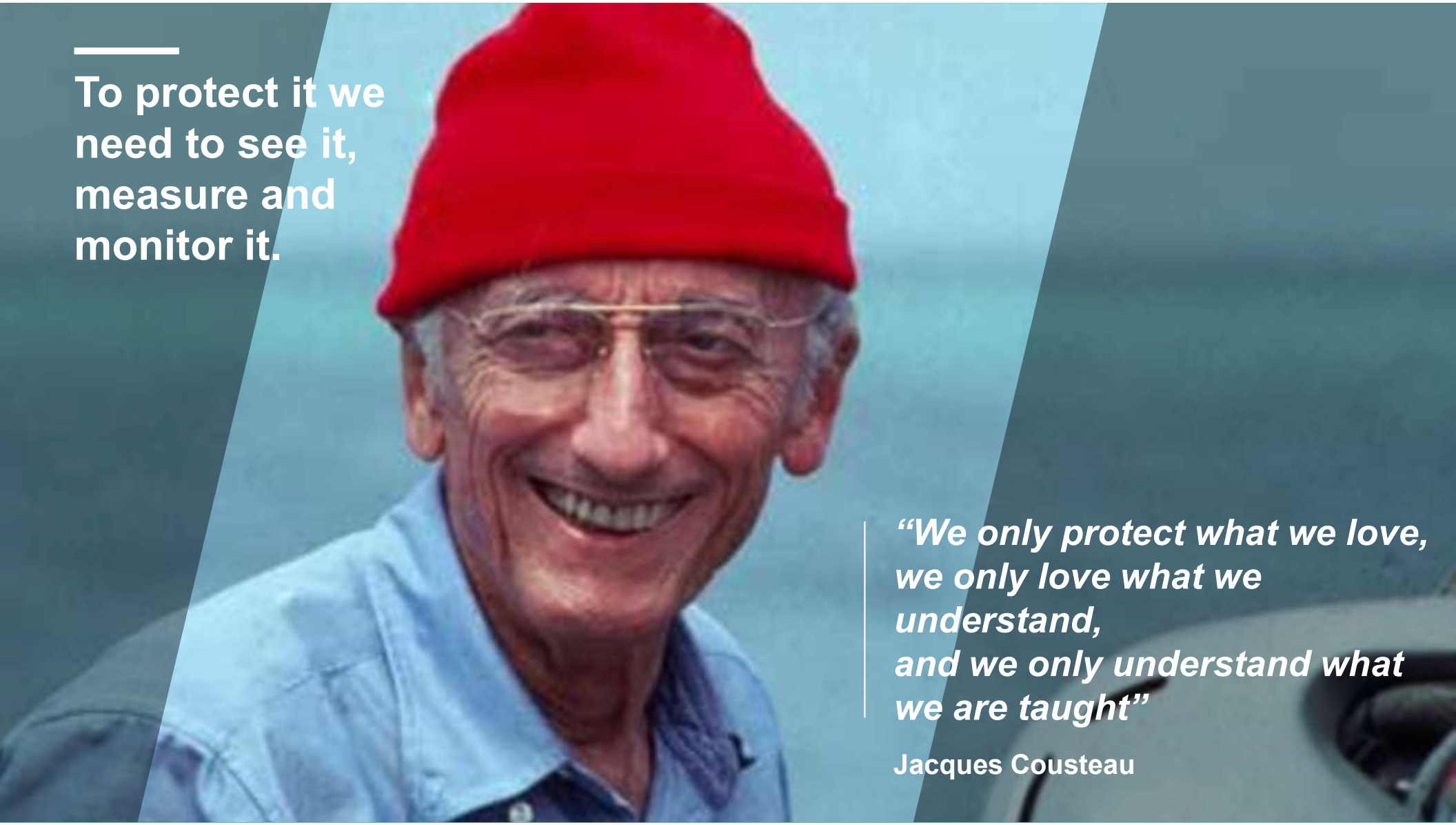
MC1 [@WADDINGTON Andy] this slide is also in Steve's part (slide 5) – not a big problem, just FYI
MAURI Cristina; 2025-04-03T12:02:57.124


MC1

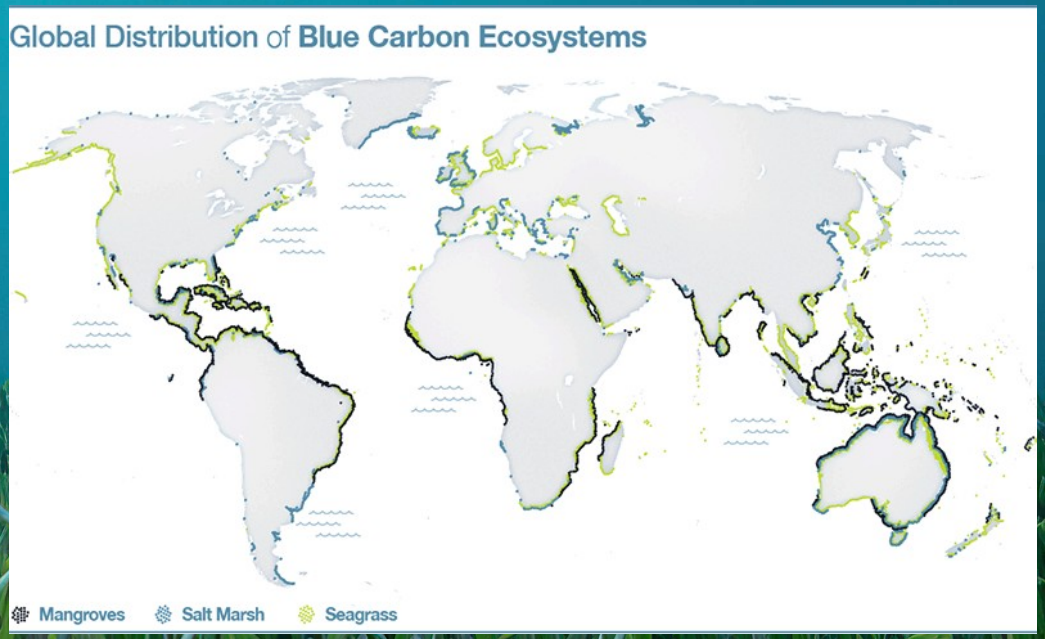
Slide nummer 20

MC1 [@WADDINGTON Andy] I am also adding this video I got from Thomas!
MAURI Cristina; 2025-04-03T12:32:03.853


Our oceans are critical to support our lives
50%
Oxygen Generation
90%
Excess heat from emissions captured
15%
Animal proteins we eat
3B
People livelihood
3$ Tr.
Value per year
Source: UN, 5 reasons you should care about our ocean


To protect it we need to see it, measure and monitor it.
“We only protect what we love, we only love what we understand,
and we only understand what we are taught”
Jacques Cousteau

Seagrass captures more CO2 than rain forests but is at risk



60-70 million hectare

vital blue carbon habitat potential globally

4X more CO2 captured

Blue Carbon ecosystems sequester approximately 4X more greenhouse gasses than their rainforest counterparts, 15x faster

7% lost annually

due to trawling, shore development and pollution. A football field every 7 min.

Source: The blue carbon initiative

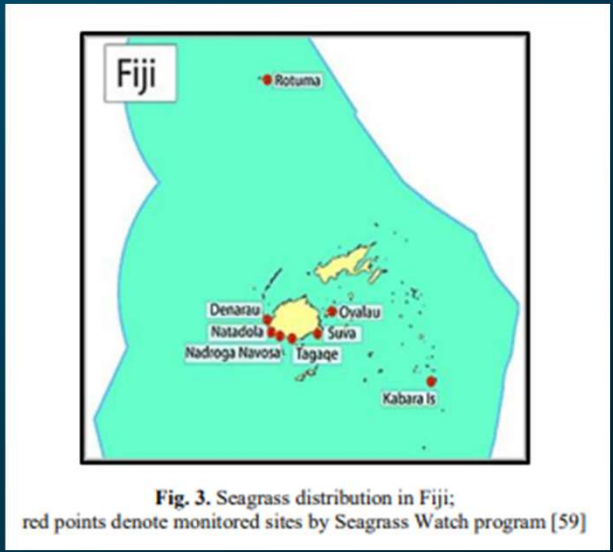
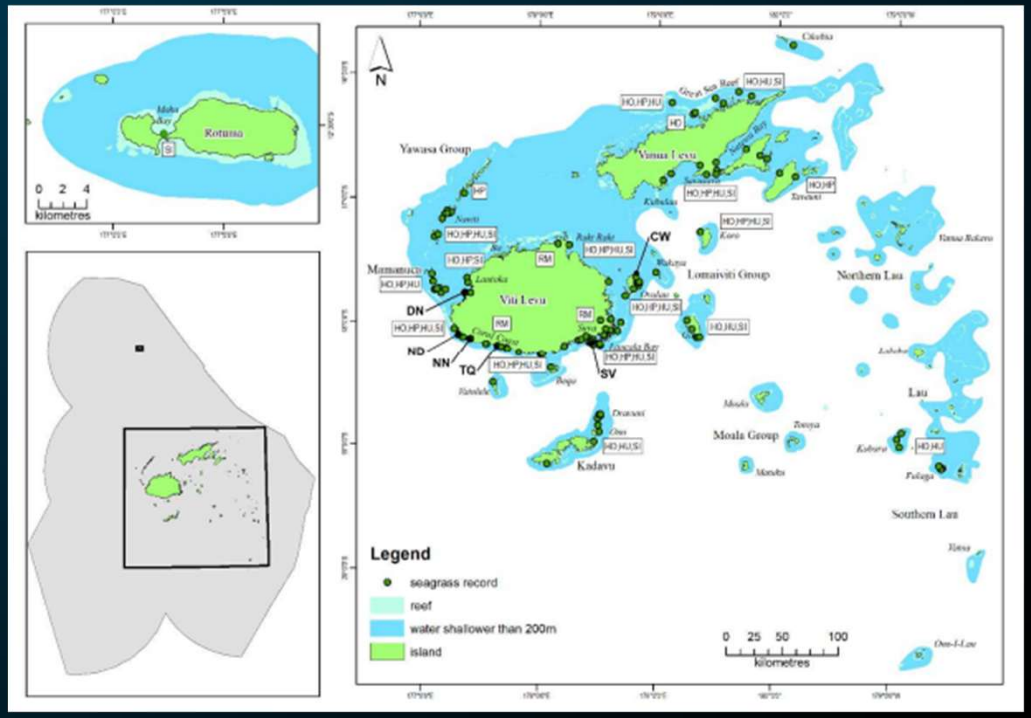


Fig. 3. Seagrass distribution in Fiji;
red points denote monitored sites by Seagrass Watch program [59]

IMPORTANCE OF SEAGRASSES - A REVIEW FOR FIJI ISLANDS Shalini SINGH



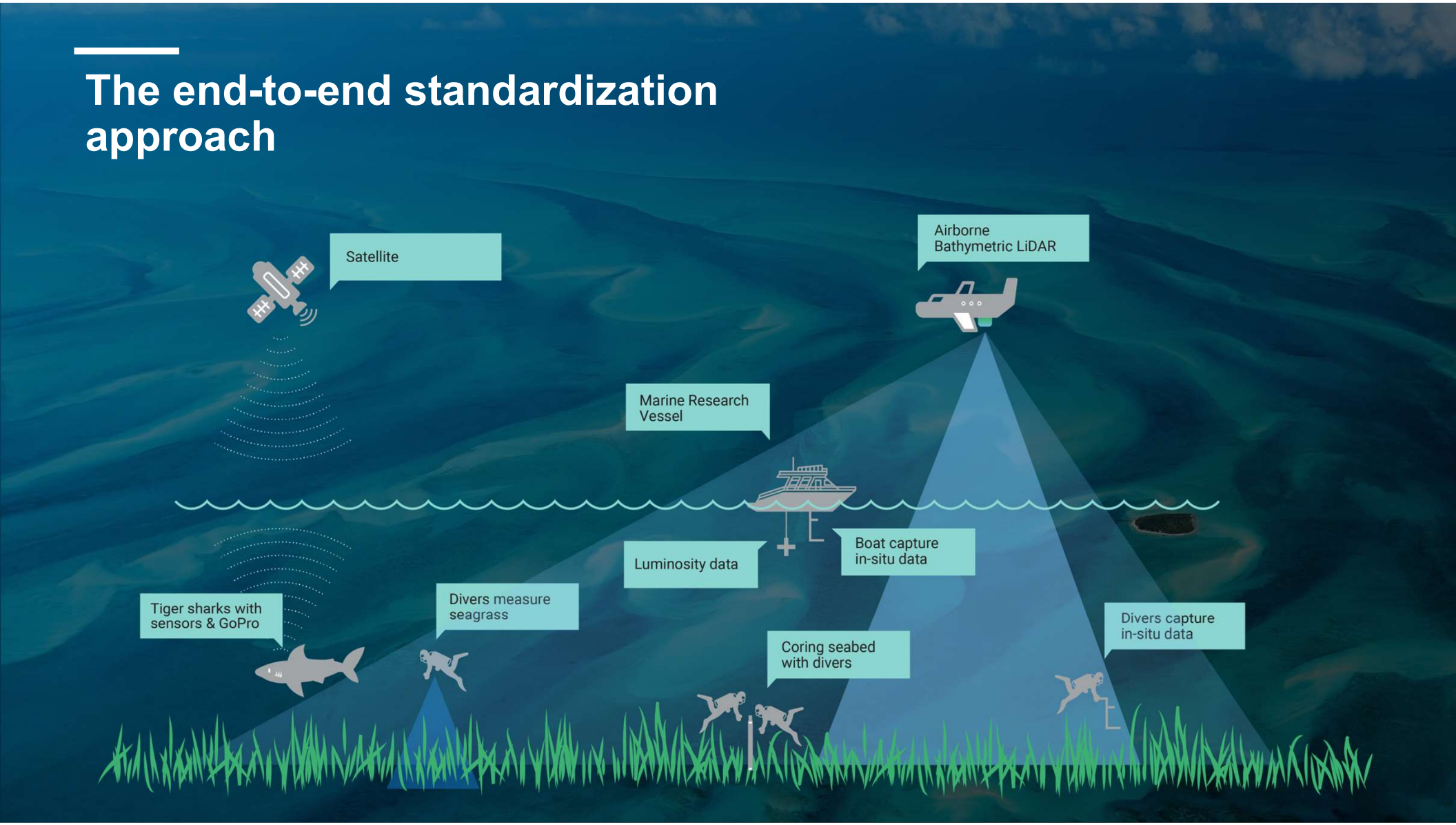
OVER A DECADE MONITORING FIJI'S SEAGRASS CONDITION…. J. McKenzie and Rudi L. Yoshida

"Due to their importance in climate change mitigation, biodiversity conservation, and the local economy, it is vital that we protect this ecosystem together using a coordinated and unified approach."

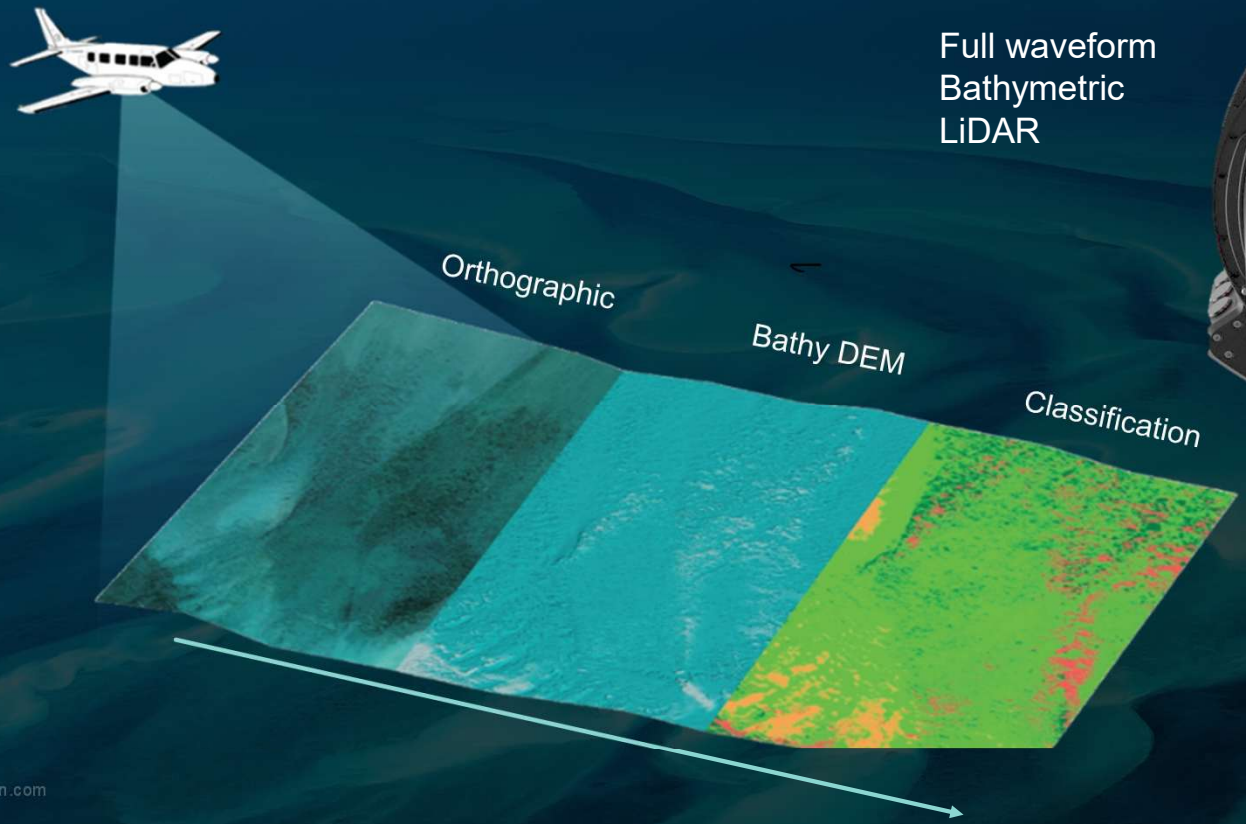
Seagrass – More than just carbon sinks 6 August 2024
By Falma Aiviji, Henry Kaniki, Joeli Bili, Mazzella Maniwavie and Shalini Singh

Pacific Community
Communauté du Pacifique

The end-to-end standardization approach



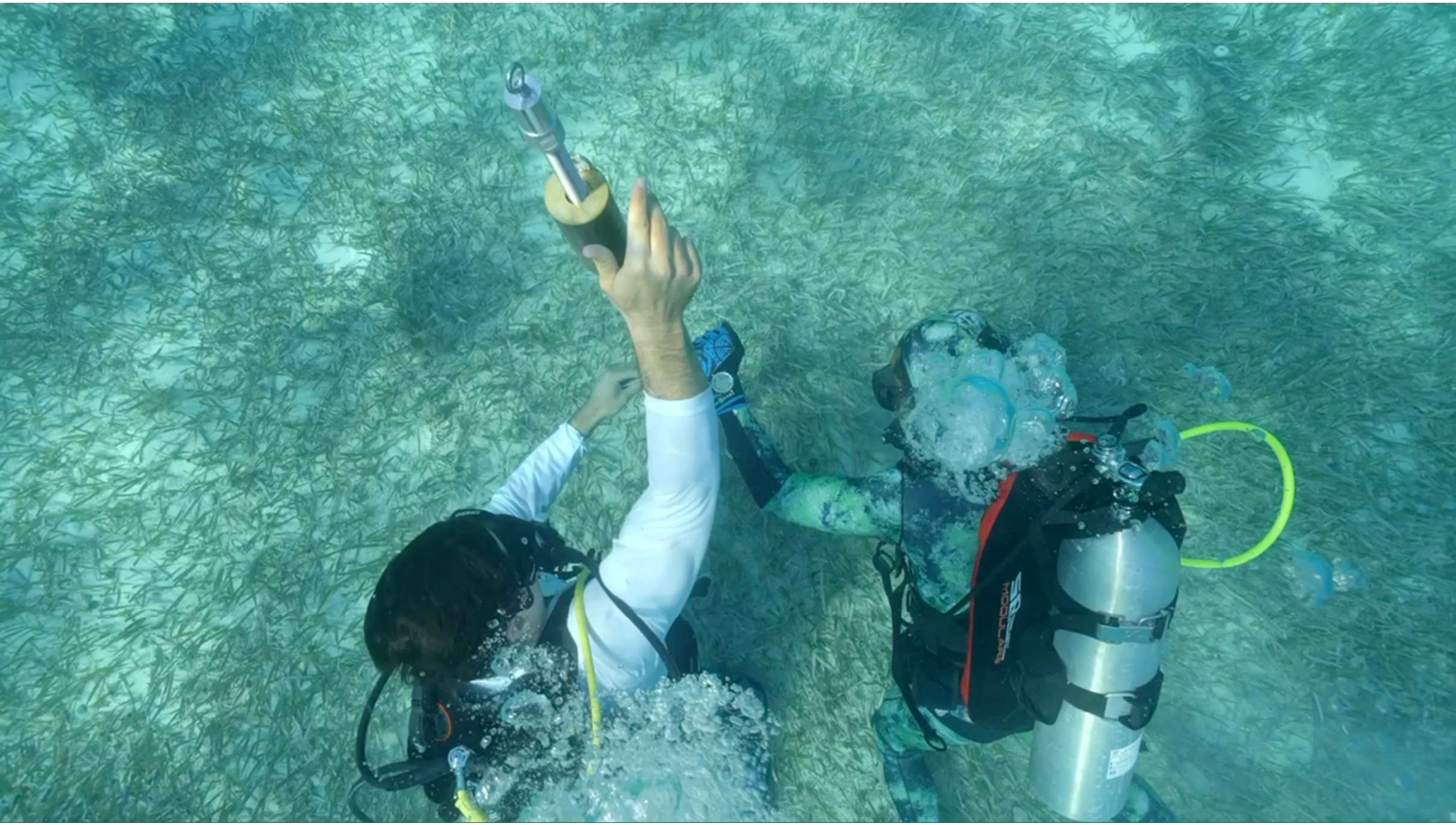
Chiroptera-5 Bathymetric LiDAR – full waveform LiDAR with Multispectral imagery



Full waveform Bathymetric LiDAR

Topographic LiDAR

Four band imaging



Seagrass Classification

Seagrass classification requires accurate segmentation of sea-bed classes and labelling of training data for machine learning purposes.

Hexagon's automatic sea-bed classification workflow consists of data normalization, classification algorithm setup and machine learning training.

The results of the automatic sea-bed classification algorithm are validated against the in-situ data, independently of training data.

Dense Seagrass

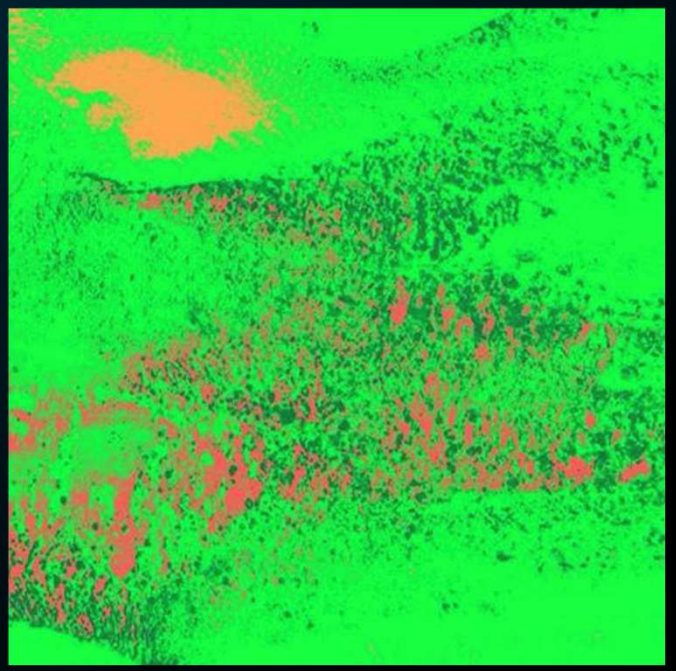
Sand

Very Sparse Seagrass

Medium Algae

Tall Vegetation

Sparse Seagrass



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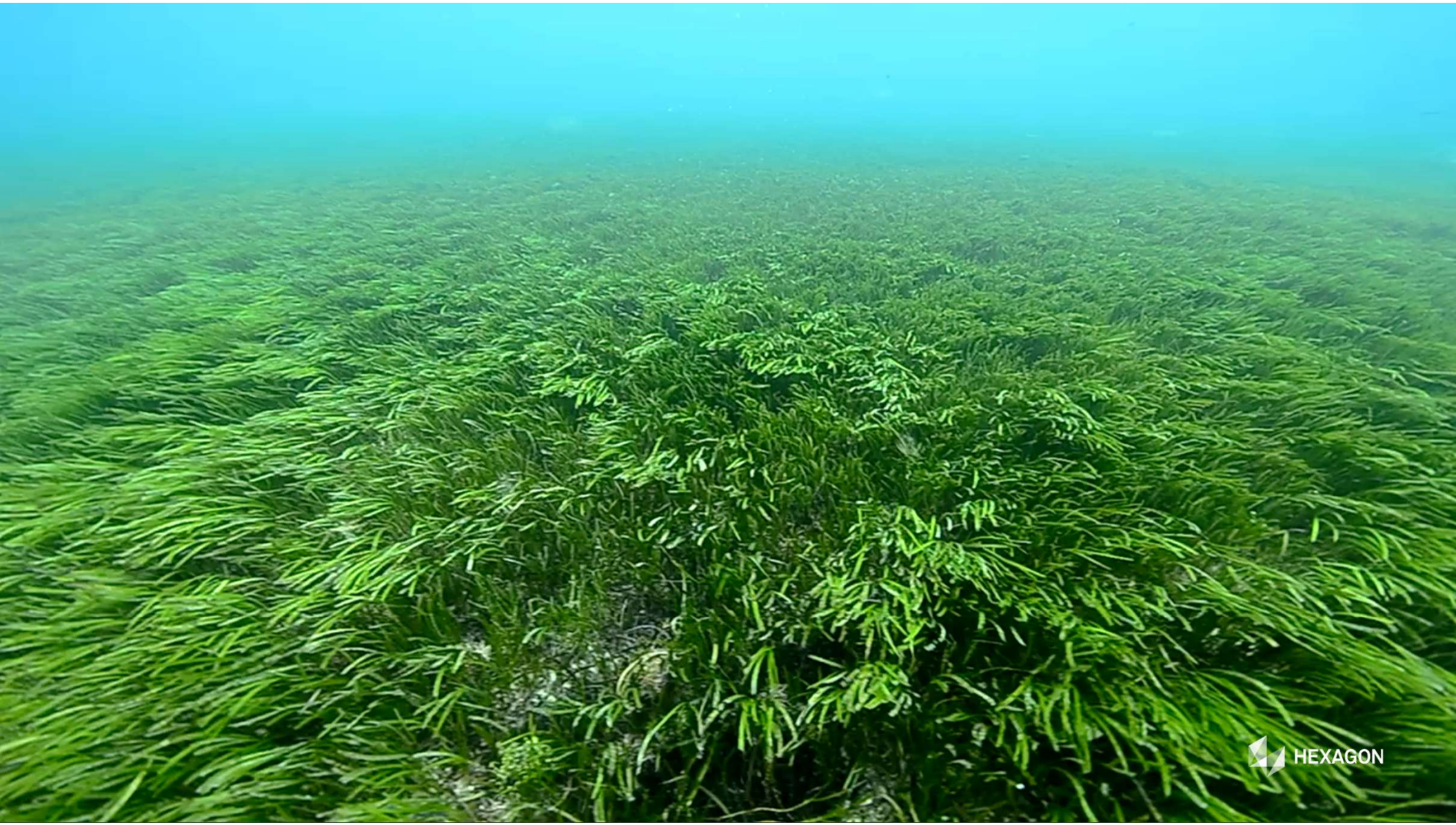
Working with the original owners to build a sustainable business case

Bahamas Project

Sacramento River Project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Mapping seagrass – a business model to protect the environment

Customer's challenge

Mapping seagrass meadows is essential to recognise their role in mitigating climate change. However, seagrass has been poorly surveyed and preserved.

Hexagon's solution

Seagrass grows in shallow and clear waters – the environment where Hexagon LiDAR bathymetric sensors excel.

A new business model

Recognising the link between seagrass and the Blue Carbon is an opportunity to reinvent the way industry addresses environmental issues.

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Thanks!

stephen.cooper@hexagon.com

andy.waddington@hexagon.com

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