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Autonomous inspection & monitoring of Waterways, Ports & Sea

Introductions

Todays problems are often complex having a large impact on society that can only be solved in close collaboration and with understanding of the customers & bigger context. Technology is essential herein. Especially in delta and port cities where the exponential growth of influx of people need a healthy, save and economic strong environment for living & working in the 21st century.

We dive deep in the operations with customers to understand the context and practicalities they face, from which we have built an ecosystem of partners in research, public & private sectors (customers, production partners, suppliers).

Creating solutions in unmanned and autonomous maritime survey robots and data analytics, which can measure data more frequent, real-time, in a wider area

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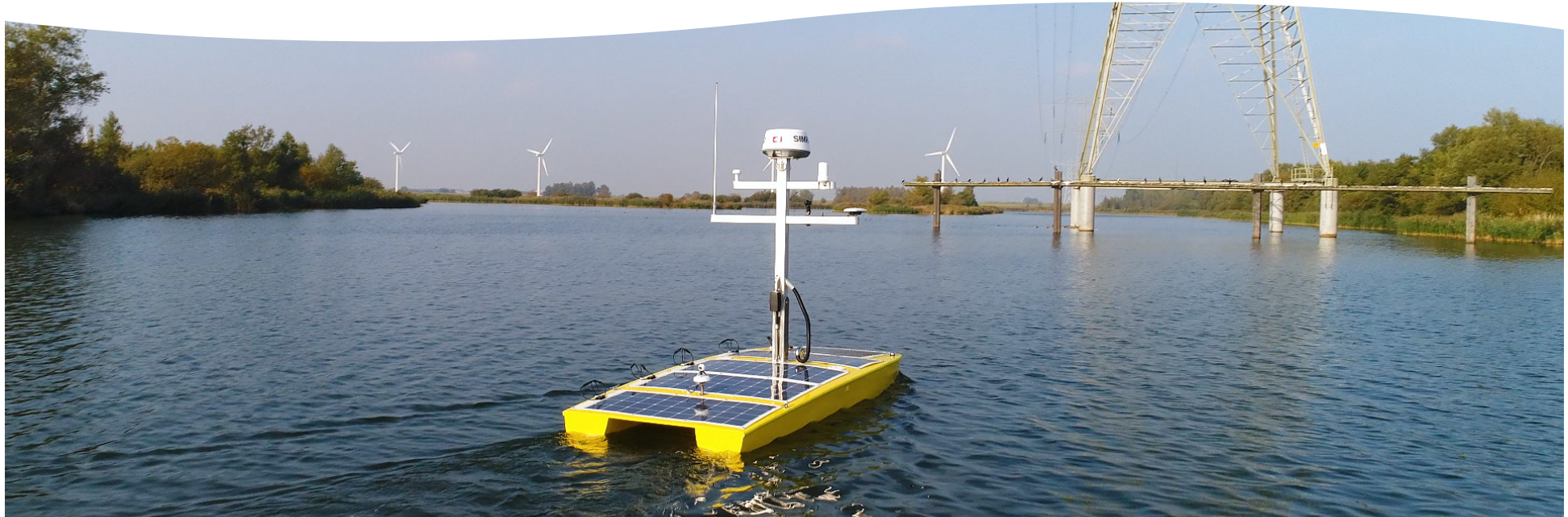
Challenges of water inspections

1. High need for more and more frequent maintenance data
2. Current costs of inspections are too high
3. Conventional inspections are labor intensive & unsafe
4. There's a big demand for real time & multiple data collection
5. Clients do not have full insight in the effects of costly maintenance



Aquatic Drones solutions

Multi-use survey vessels with a wide range of sensory

Autonomous & swarming software

Real-time data analytics & predictive modelling

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Customers

Applied for

Ministry of Infrastructure and Water Management

Port of Rotterdam

Boskalis

waterschap Hollandse Delta

Researched by

Deltares
Enabling Delta Life

TU Delft Delft University of Technology

Aquatic Drones in operation

Bekijk hier de film

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Roadmap maritime robotics

PAST -PRESENT Unmanned & on shore or ship controlled

PAST-PRESENT Autonomous route planning & on shore controlled

2017-2018 Collision avoidance & on shore controlled

2018-2020 Collision avoidance & on shore monitored

2020-2025 From shore monitored to incident based monitored

2017-2020/25 Swarming & from shore to incident based monitored

2017-2020/25 Platooning & from ship to incident based monitored

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Essentials for application

High end system & software integration including

Navigation: Radar, AIS, Cameras, lidar

Survey: RTK/GNSS, Motion Sensor, SVP, Sonar

Communication: G3/4, SATCOM

Intelligence: Computing Power & Pre Processing

Stability: Wind force 7 / Sea state 4-5

Range: 8-12 hours / 100 km

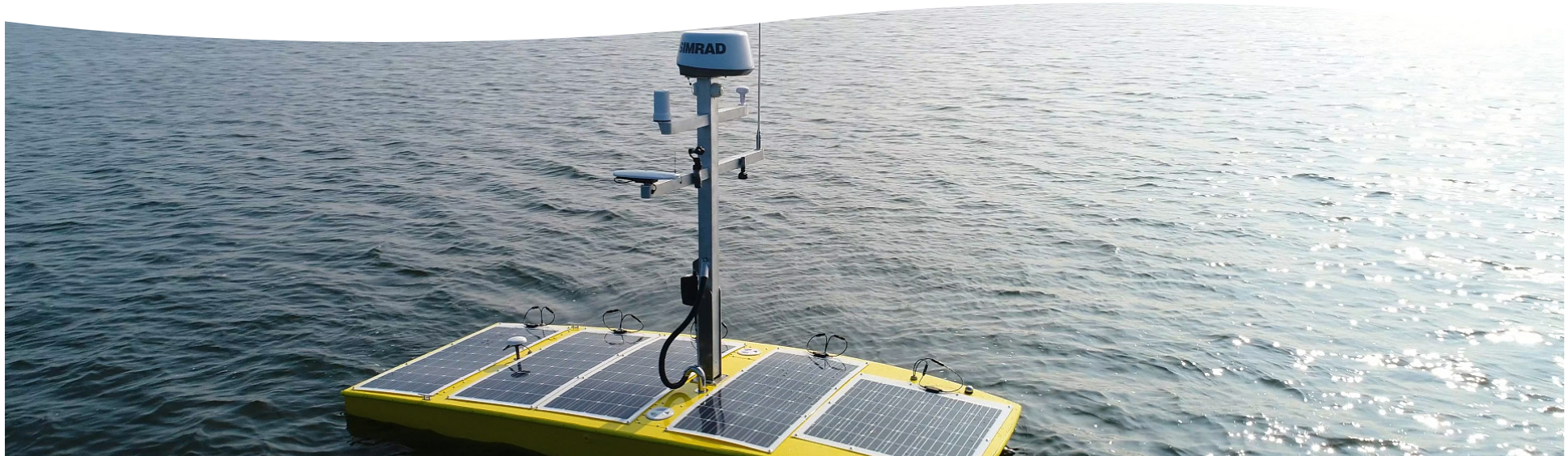
Costs estimation

Data service: €3000-4000 p/day with data processing

Drone production: 50-250k or more depending on size and system integration

Sensors: €50-300k depending on quality requirements

Extra features: operations outlasting 8 hour working days, shallow waters, 24 hour port monitoring of berths, multiple applications, scalable, limit human risks & failures, zero emissions , real-time data insight



Results 2017-2018

Assignments

Dutch Ministry of Infrastructure / River Ijssel (Oct 2017): bathymetry

Port of Rotterdam / 2e Katendrechtsehaven (Nov 2017): bathymetry

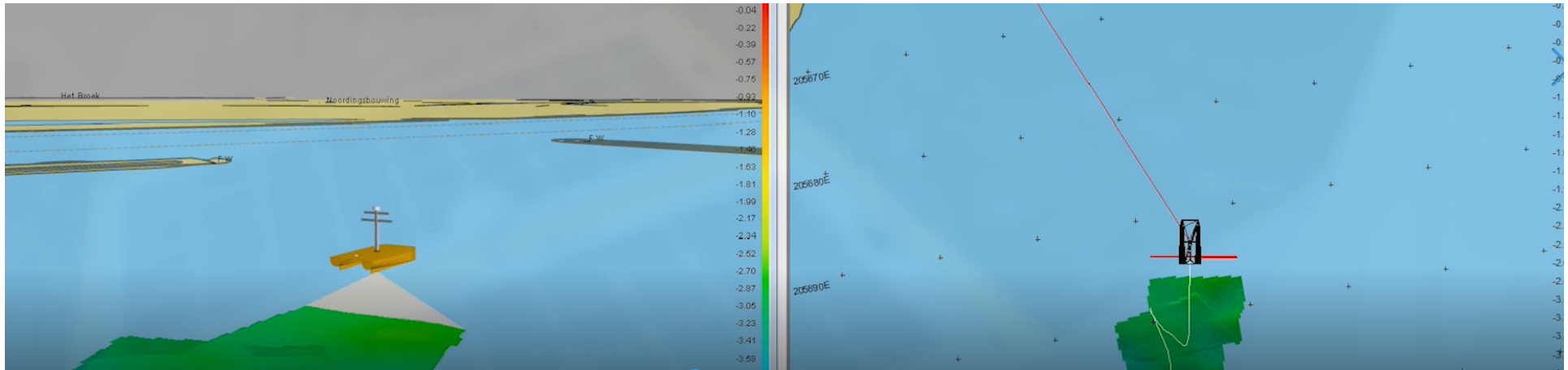
Water Board Dutch Delta / Keen (Mar-Jul 2018): sub bottom

Data products

1. Post processed data with corrected hydrographical measurement

2. Data metric DTM (3D model of seabed)

3. Backscatter mosaic



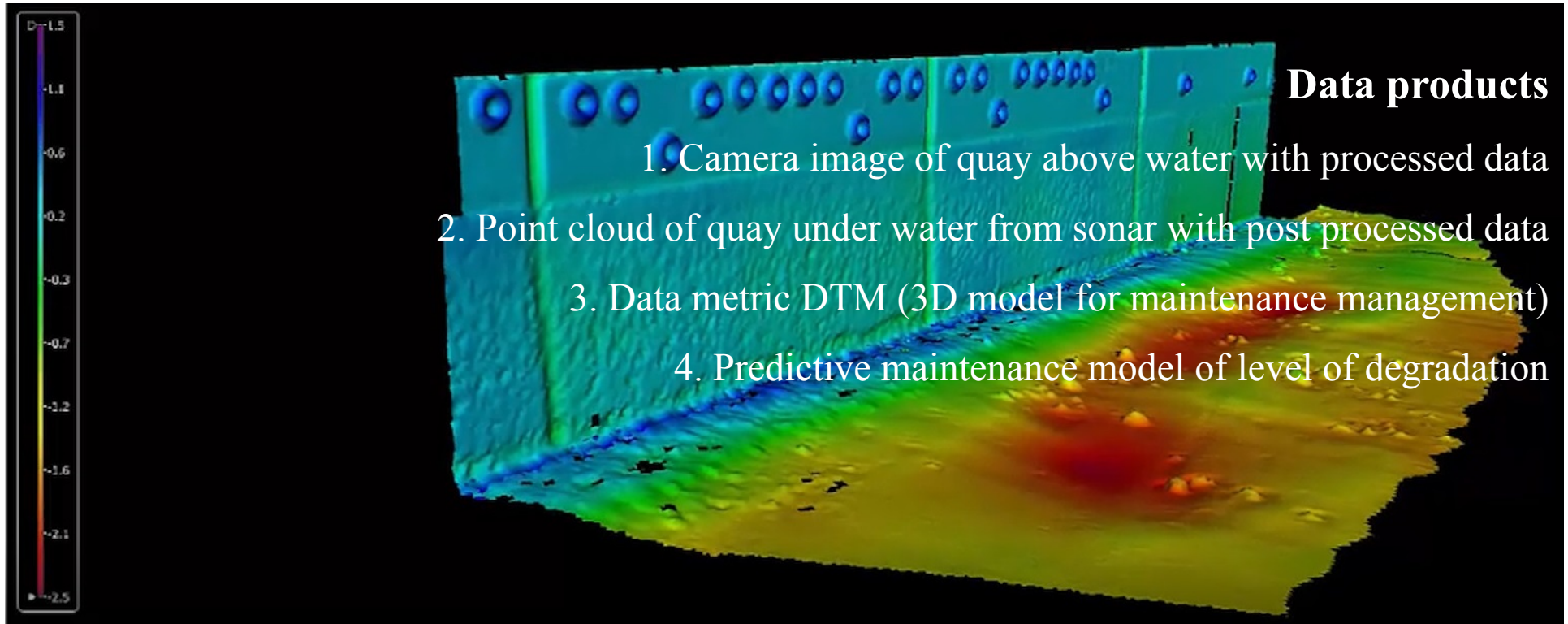
Preparation 2019

Assignments

Boskalis / Botlek Harbour Rotterdam (Dec 2019 – Jan 2019): bathymetry & sub bottom

Water Boards (Feb-Mar 2019): sub bottom & water quality

Ministry of Infrastructure / Ijssel (Mar-Dec 2019): bathymetry, dam inspection & water quality



Data products

1. Camera image of quay above water with processed data
2. Point cloud of quay under water from sonar with post processed data
3. Data metric DTM (3D model for maintenance management)
4. Predictive maintenance model of level of degradation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maritime maintenance: smart, save & clean
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