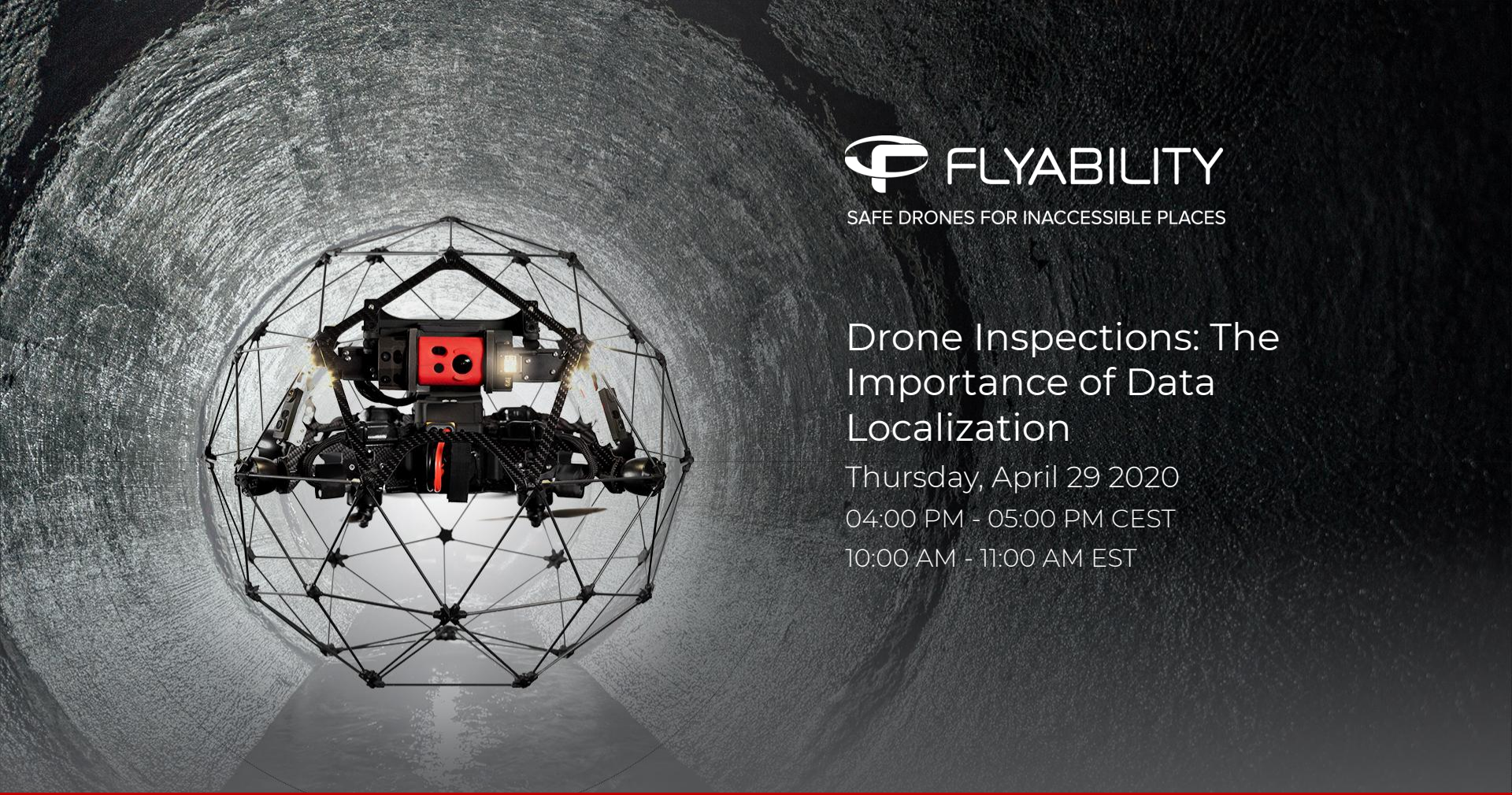


FLYABILITY

SAFE DRONES FOR INACCESSIBLE PLACES

Drone Inspections: The Importance of Data Localization

Thursday, April 29 2020

04:00 PM - 05:00 PM CEST

10:00 AM - 11:00 AM EST

DRONE INSPECTION WEBINAR SERIES

—WEBINAR 6 OF 6—

PRESENTED IN PARTNERSHIP WITH MFE

FLYABILITY

MFE

MODERATOR

Zacc Dukowitz
Content Marketing Manager
—Flyability—

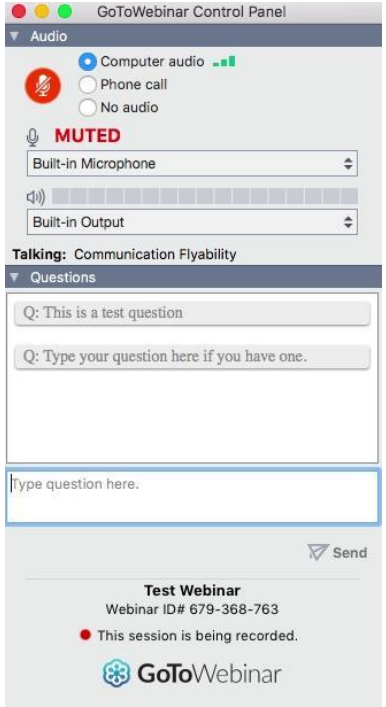
PANELISTS

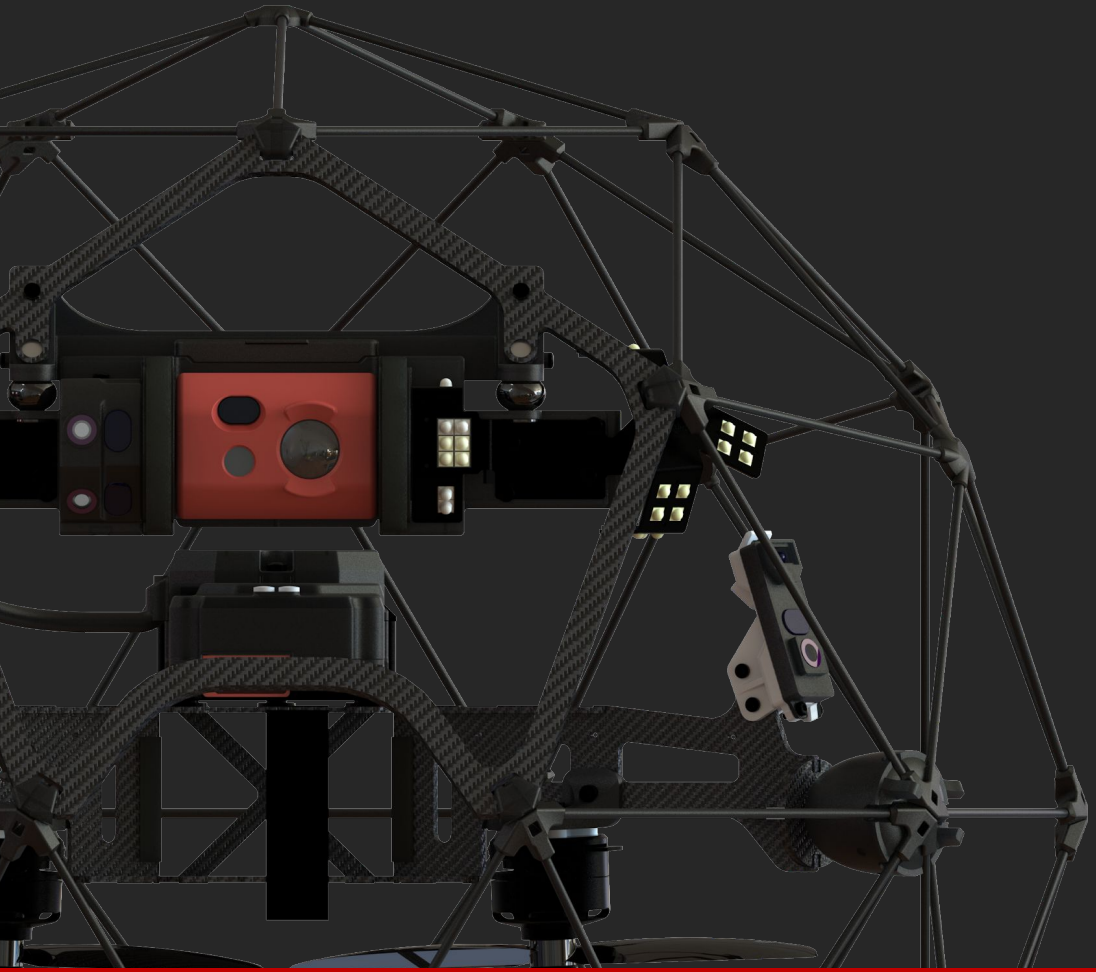
Simon Kumm
Managing Director
—InspecDrone GmbH—

Geoffroy le Pivain
Product Manager
—Flyability—

WEBINAR ENGAGEMENT

Ask questions during the webinar.





REPLAY

The recording of this webinar will be sent to you afterward.

AGENDA

1 5’ Introduction

2 20’ Zacc Dukowitz, Flyability

Data localization: what it is and why it matters

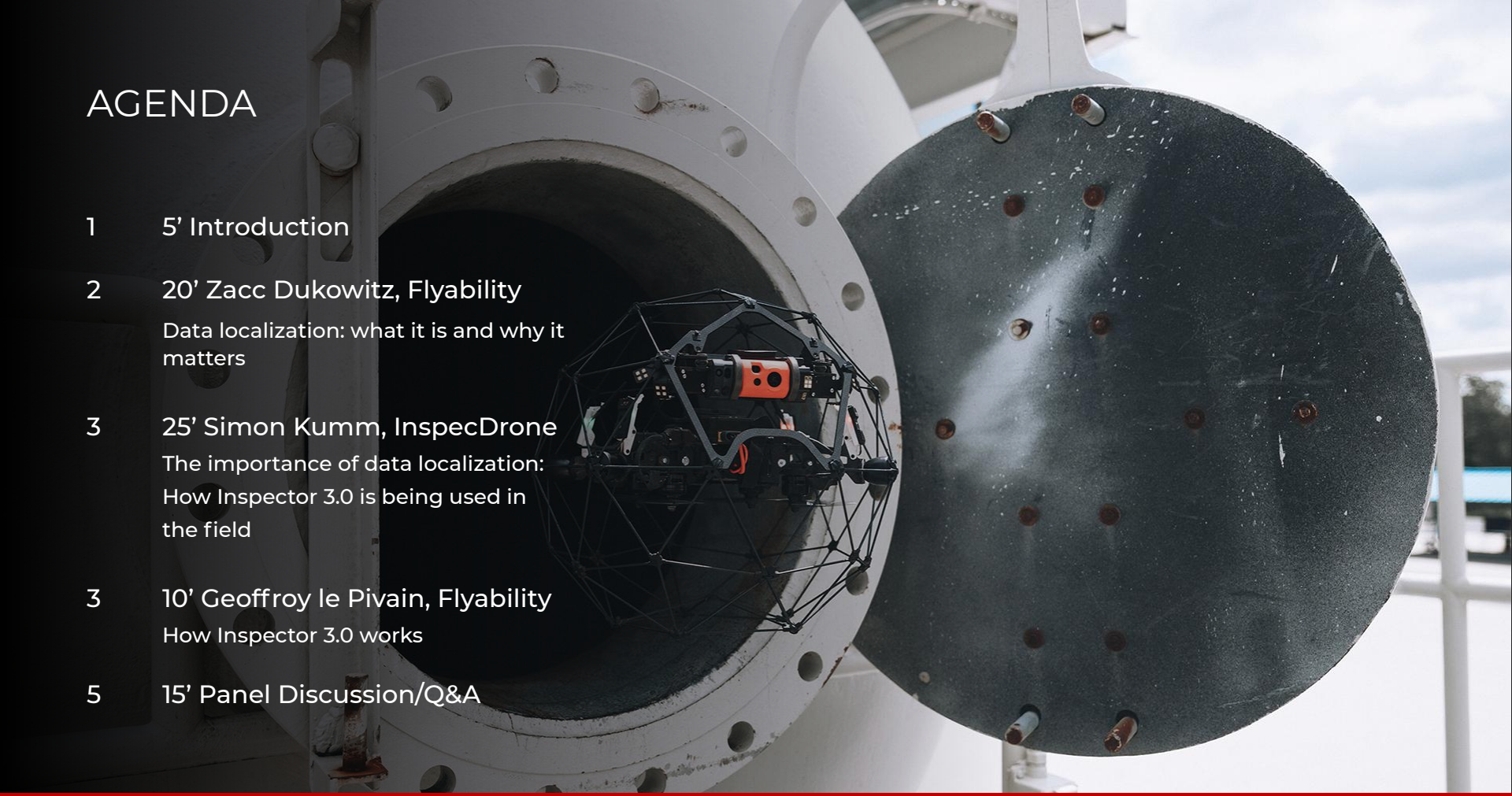
3 25’ Simon Kumm, InspecDrone

The importance of data localization: How Inspector 3.0 is being used in the field

3 10’ Geoffroy le Pivain, Flyability

How Inspector 3.0 works

5 15’ Panel Discussion/Q&A



Data Localization: What It Is and Why It Matters

Zacc Dukowitz
Content Marketing Manager

FLYABILITY

What Is Data Localization?

Data localization = locating the defect(s) you see in your inspection data within an asset.

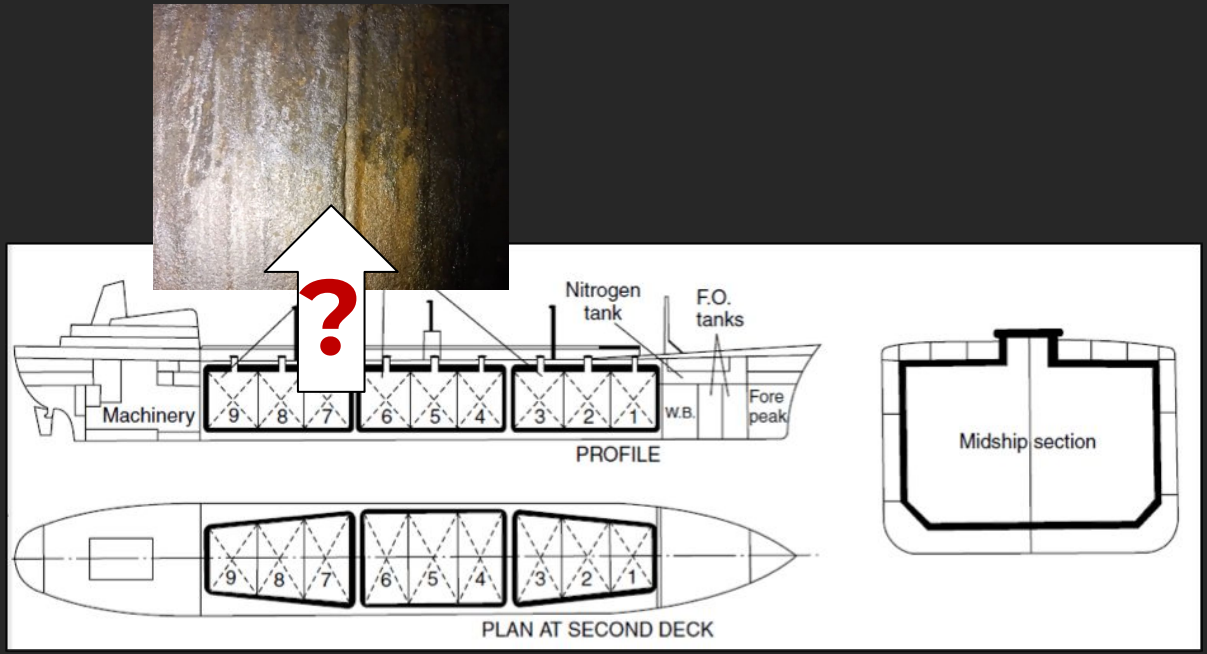
Defect examples

Crack found in a cargo tank on an oil tanker.

Wasted burner found in a boiler at a power plant

What Is Data Localization?

You know there's a defect—
but where is it located within the asset?



How Do Inspectors Currently Localize Data?

Manual / direct inspection

You know where the defect is located because you're standing in front of it when you see it.

Drone inspection

This is more difficult—inspectors may see a defect in their inspection footage but not know where it is located in the asset. (This is true for all RVI* data, not just drone data.)

*RVI = Remote Visual Inspection

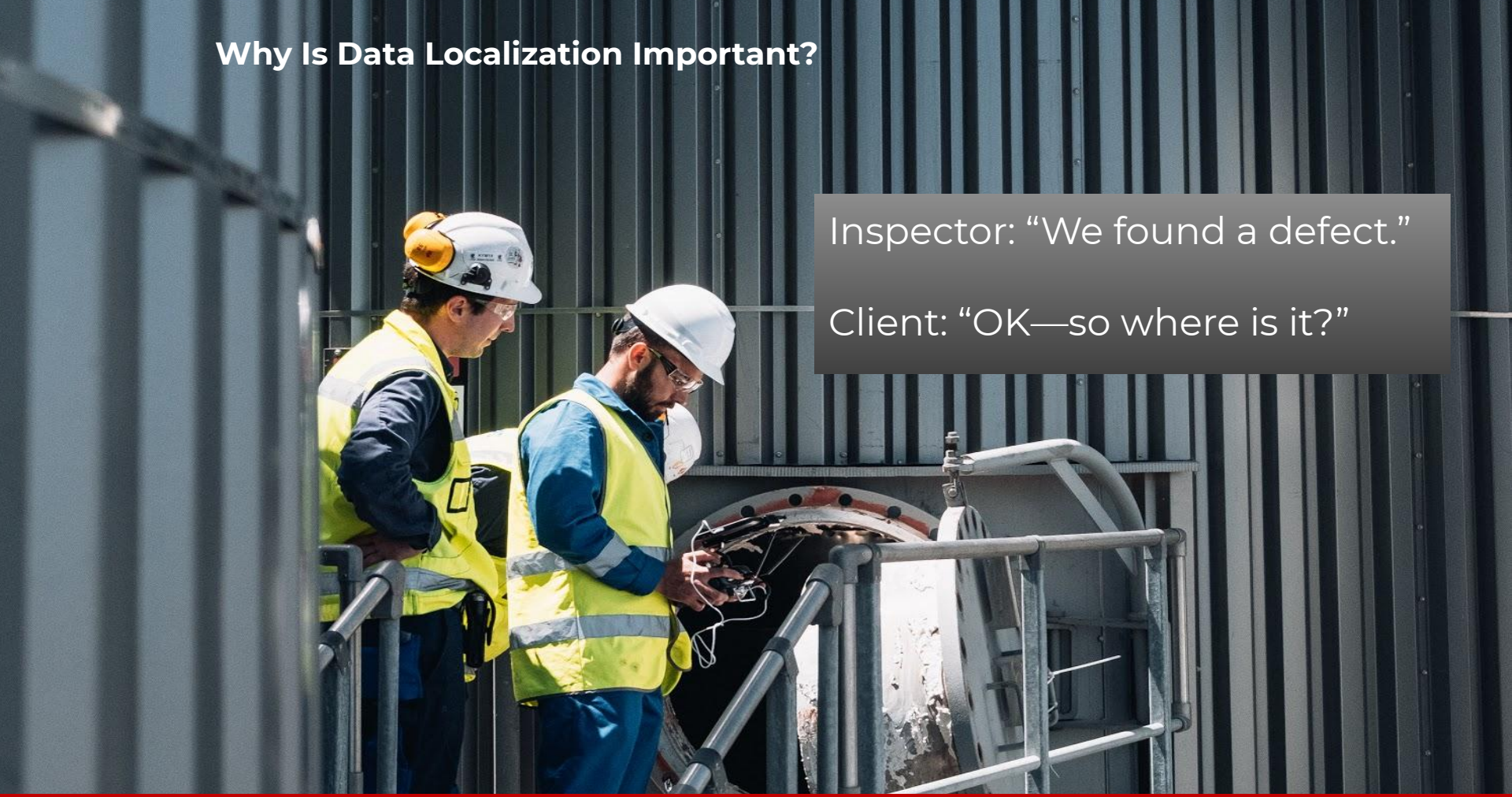
How Do Inspectors Currently Localize Visual Data Collected Remotely?

To find the location of defects in assets inspectors currently combine several data points, including:

- Barometric measurements
- Maps
- Blueprints
- Reference points found in the video feed
- Using approximations of the speed of the drone and time passed

. . . and even with all this information, getting the location right can still be a challenge.

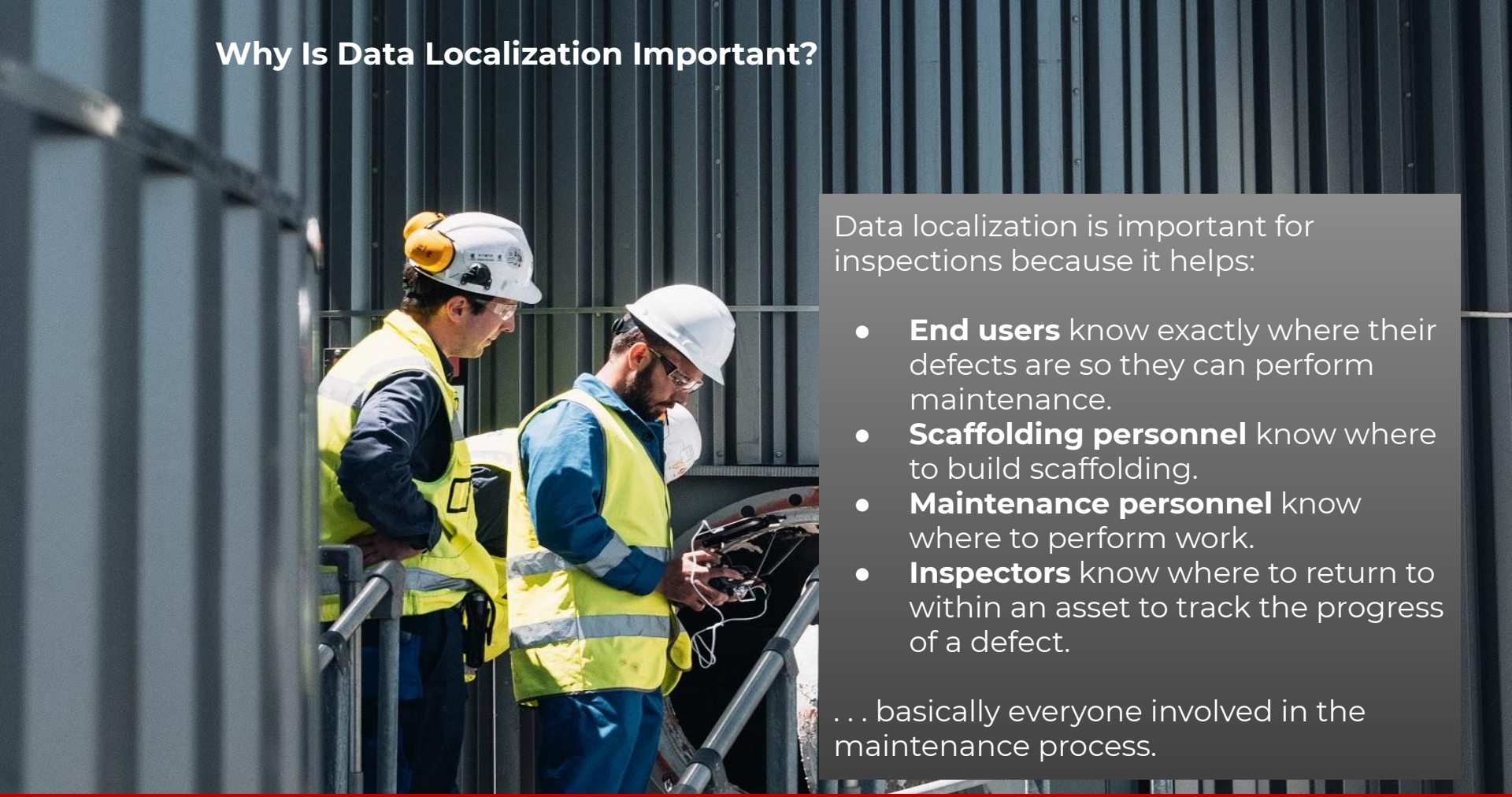
Why Is Data Localization Important?



Inspector: “We found a defect.”

Client: “OK—so where is it?”

Why Is Data Localization Important?



Data localization is important for inspections because it helps:

- **End users** know exactly where their defects are so they can perform maintenance.
- **Scaffolding personnel** know where to build scaffolding.
- **Maintenance personnel** know where to perform work.
- **Inspectors** know where to return to within an asset to track the progress of a defect.

. . . basically everyone involved in the maintenance process.

The Importance of Data Localization: Three Questions for Inspectors

*But data localization is actually the **last** consideration for inspectors.*

Inspectors need to answer three questions:

1. Are there any defects in the asset?
2. What are the dimensions of the defect?
3. Where are the defects located in the asset?

The Importance of Data Localization: Three Questions for Inspectors

1. Are there any defects in the asset?

RVI tools like drones help answer this question—and provide several benefits while doing so:

- **Safety**. Avoiding confined space entry and work at height
- **Savings**. Avoiding cost of scaffolding and reducing personnel requirements
- **Reduced downtimes**. Creating additional savings by reducing time asset is offline.

The Importance of Data Localization: Three Questions for Inspectors

2. What are the dimensions of the defect?

But seeing a defect is just the first step.

The next step is to understand its dimensions, so inspectors and other maintenance personnel can determine whether it should be monitored or fixed.

The Importance of Data Localization: Three Questions for Inspectors

3. Where are the defects located in the asset?

This is often the hardest question to answer.

The Importance of Data Localization: Three Questions for Inspectors

These three questions have shaped Flyability's product roadmap since we launched in 2016.

Inspectors need to answer three questions:

1. **Are there any defects in the asset?** Elios 1 solves this problem.
2. **What are the dimensions of the defect?** Elios 2 solves this problem.
3. **Where are the defects located in the asset?** Inspector 3.0 solves this problem.

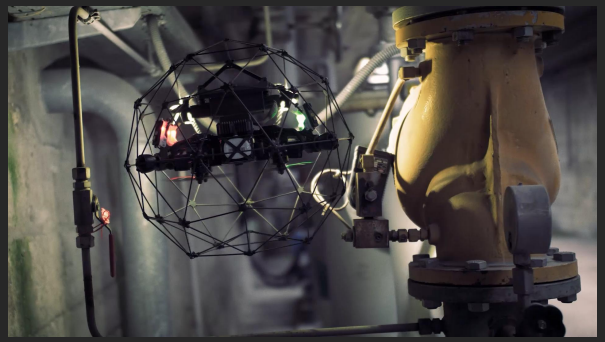
The Importance of Data Localization: Three Questions for Inspectors

1. Are there any defects in the asset?

Elios 1 helped inspectors collect visual data remotely inside assets.

2. What are the dimensions of the defect?

Elios 2 improved the quality of data collection, using a better camera, better lighting, and other features to provide inspectors with details on the defects they saw in their data.

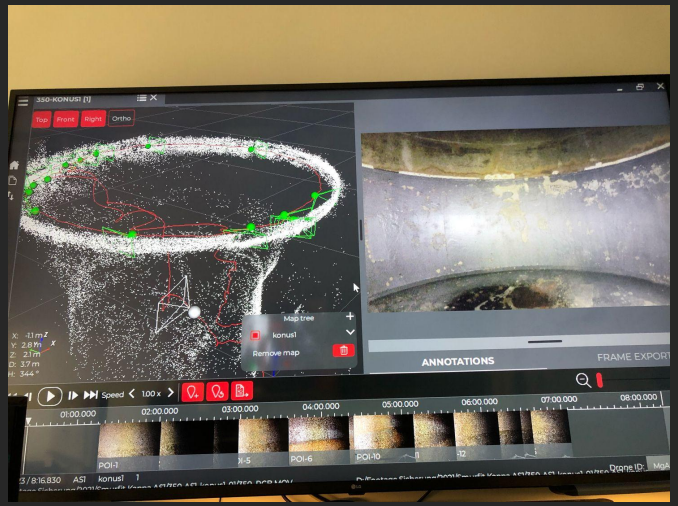


The Importance of Data Localization: Three Questions for Inspectors

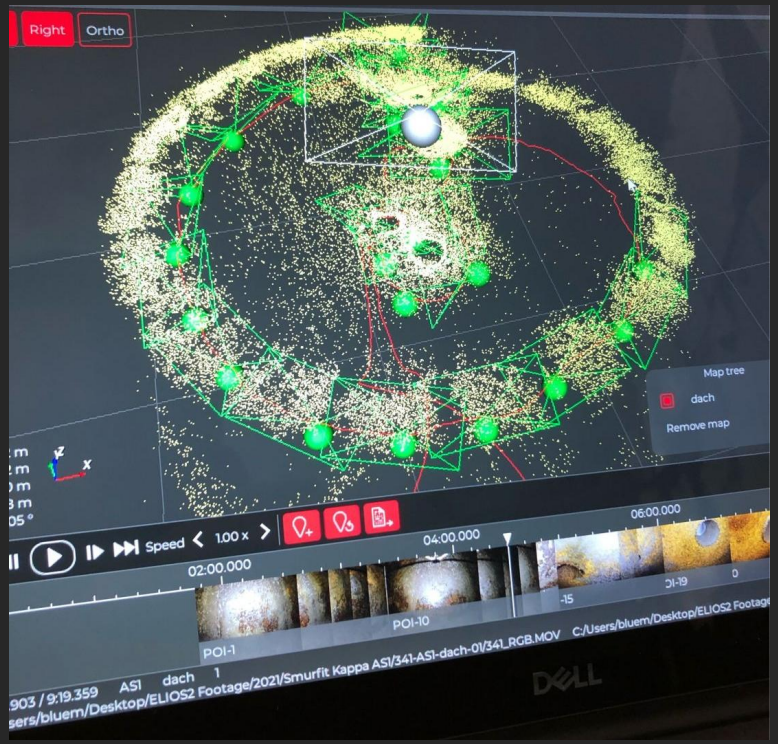
3. Where are the defects located in the asset?

Inspector 3.0 creates sparse 3D models with locational data that require 20-30 minutes processing time, allowing inspectors to locate defects while still on-site.

- Short processing time
- No extra flight path or data collection considerations
- Usable locational data
- POIs (Points of Interest) accessible by clicking on points in the model



Case study—Paper mill tank inspection



Objective

To remotely inspect a tank at a paper mill plant, looking for rust, pitting, or scratches inside it.

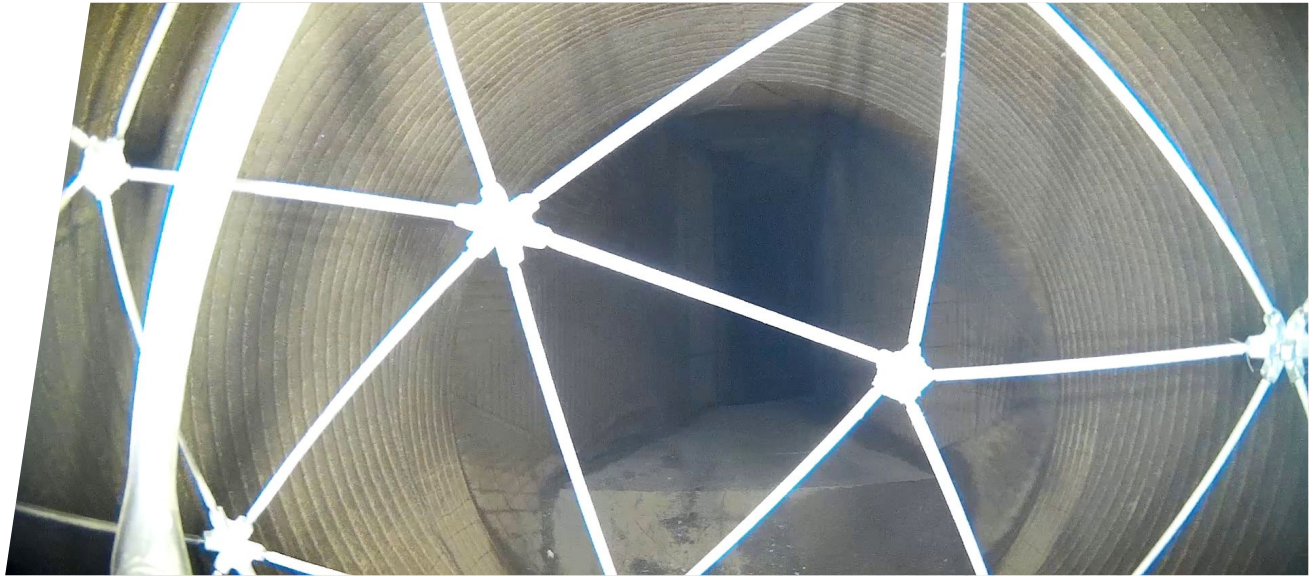
Outcomes

- **Data localization**. Inspector 3.0 allowed the inspector to create a sparse point cloud showing the specific location of rust, pitting, and other defects within the asset.
- **Reduced downtime**. Time reduced from four days to just six hours using the Elios 2.
- **Savings**. $960,000 Euros saved by reducing the downtime required for the inspection with the Elios 2.

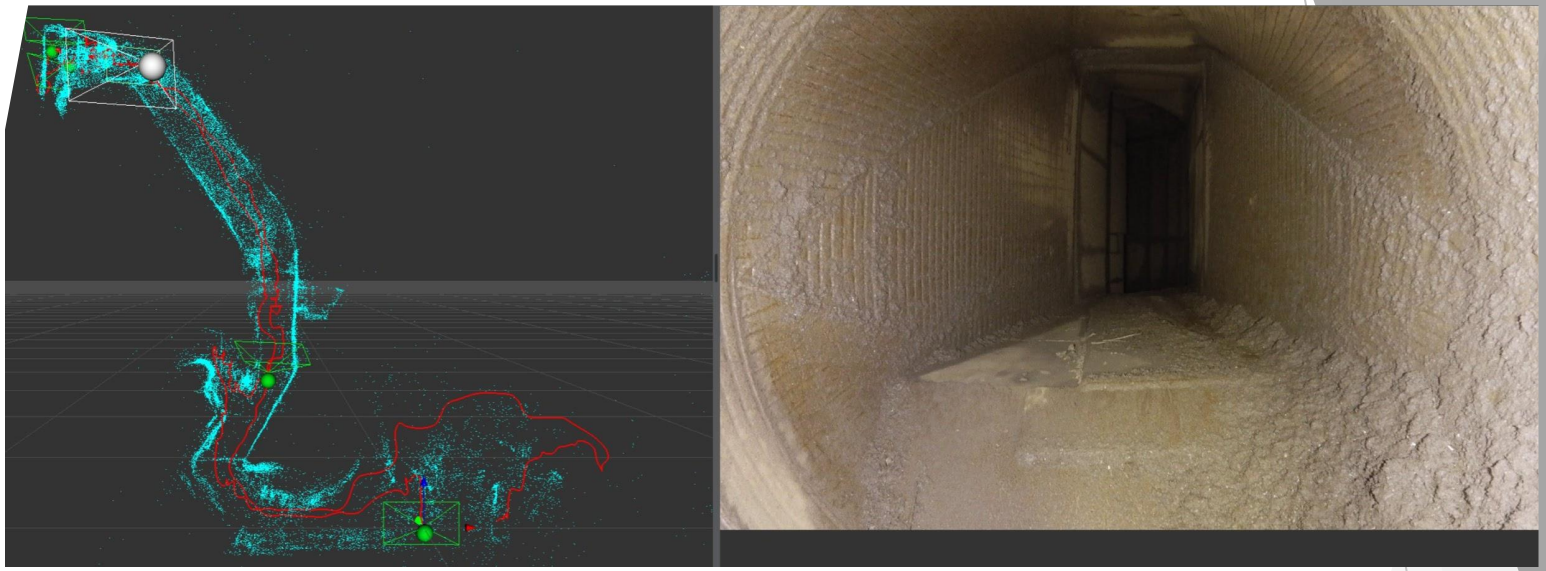
The Importance of Data Localization: How Inspector 3.0 Is Being Used in the Field

Simon Kumm
Managing Director

Inspec Drone
get inside.



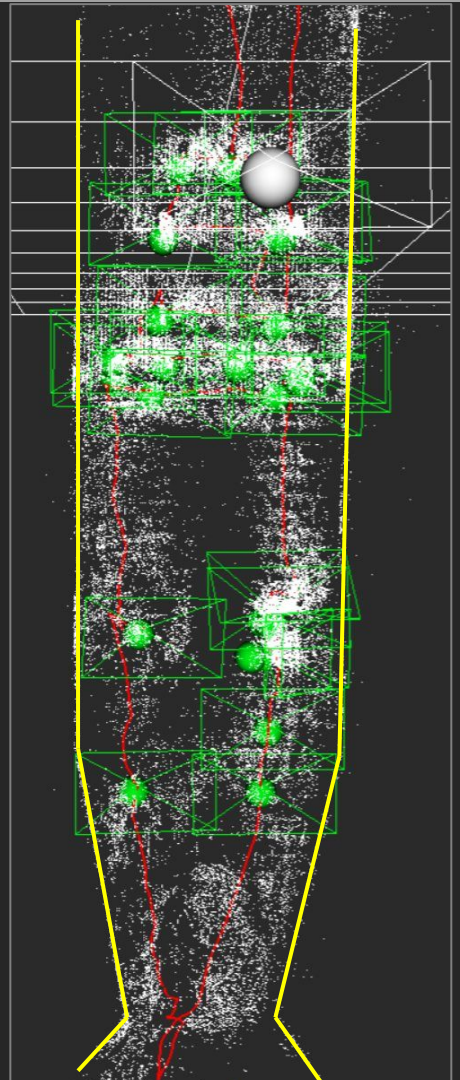
How it started …

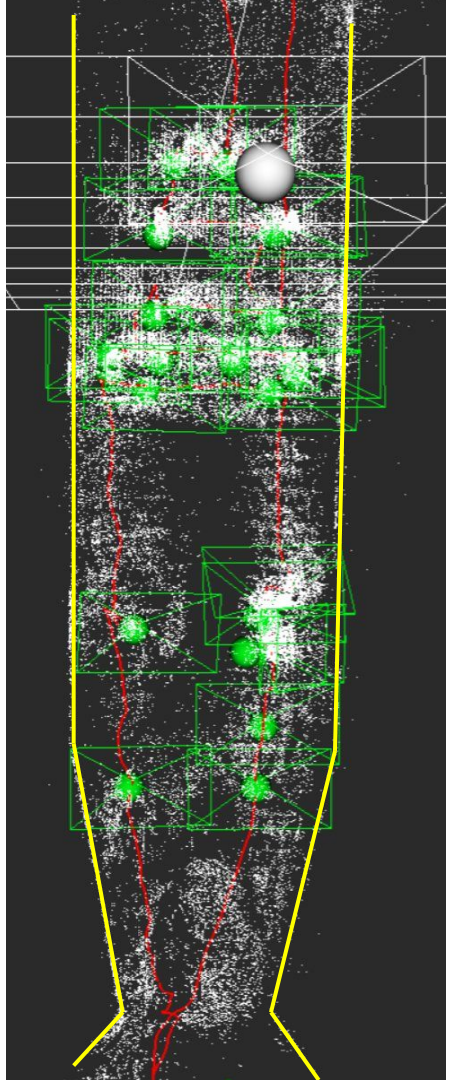


… where it led us!

On-site review of data

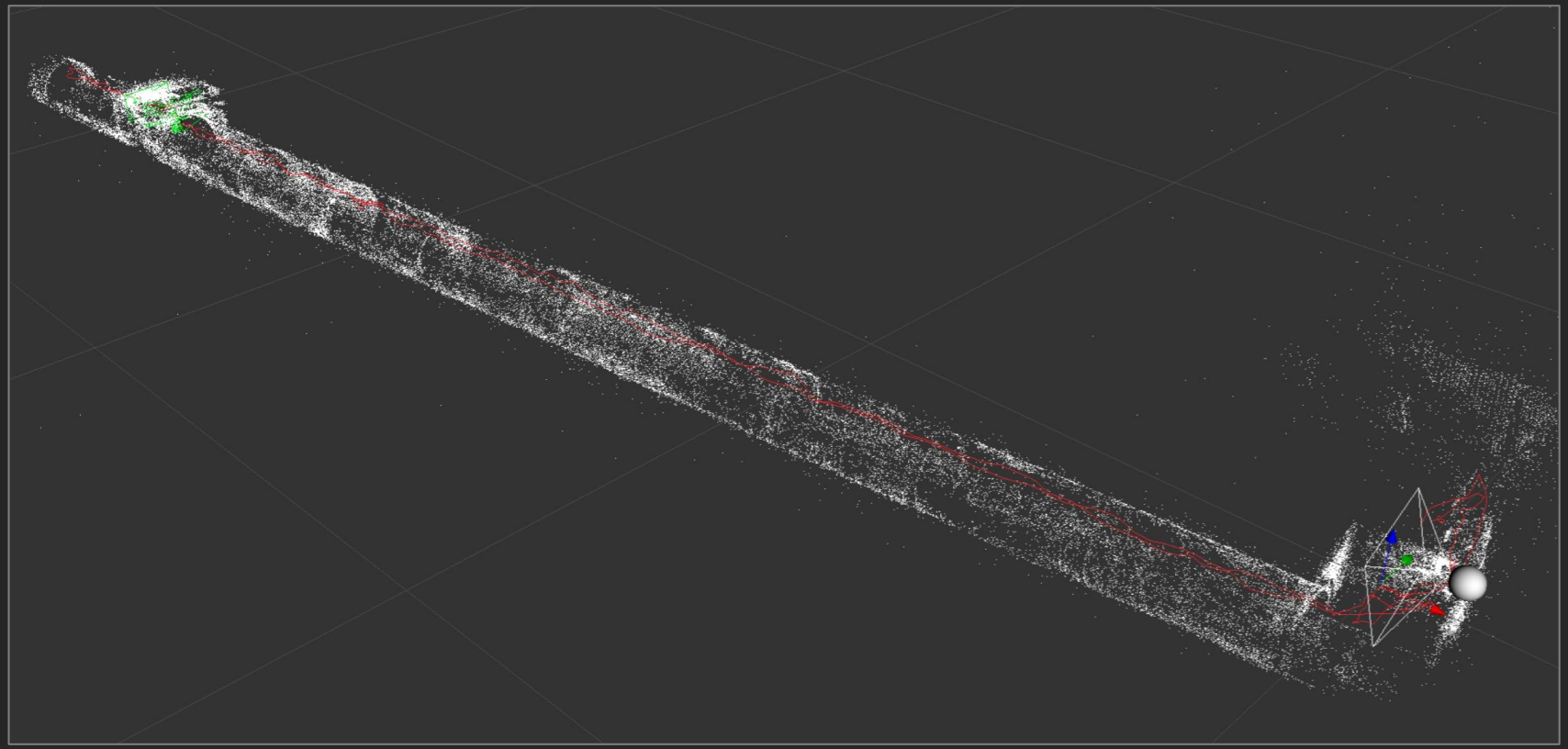
Furnace inspections





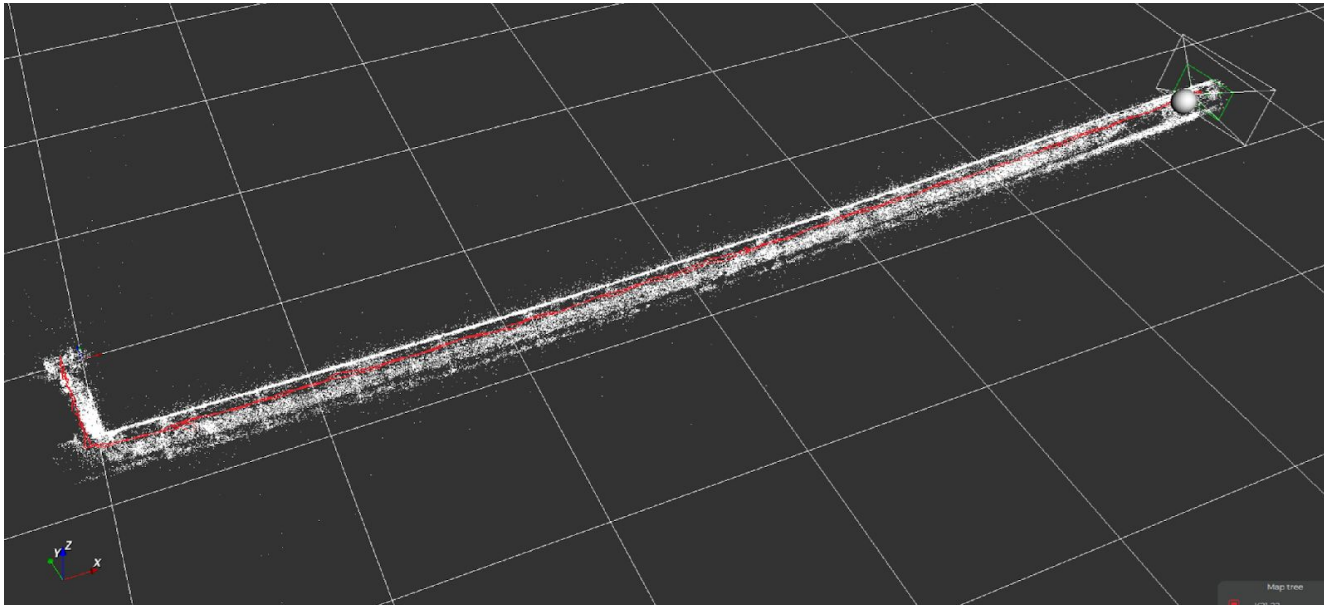
WtE plant furnace inspection

- See where the image belongs instantly
- Have everyone involved visually
- Precise coordinates for planning of further action



Sewer inspections

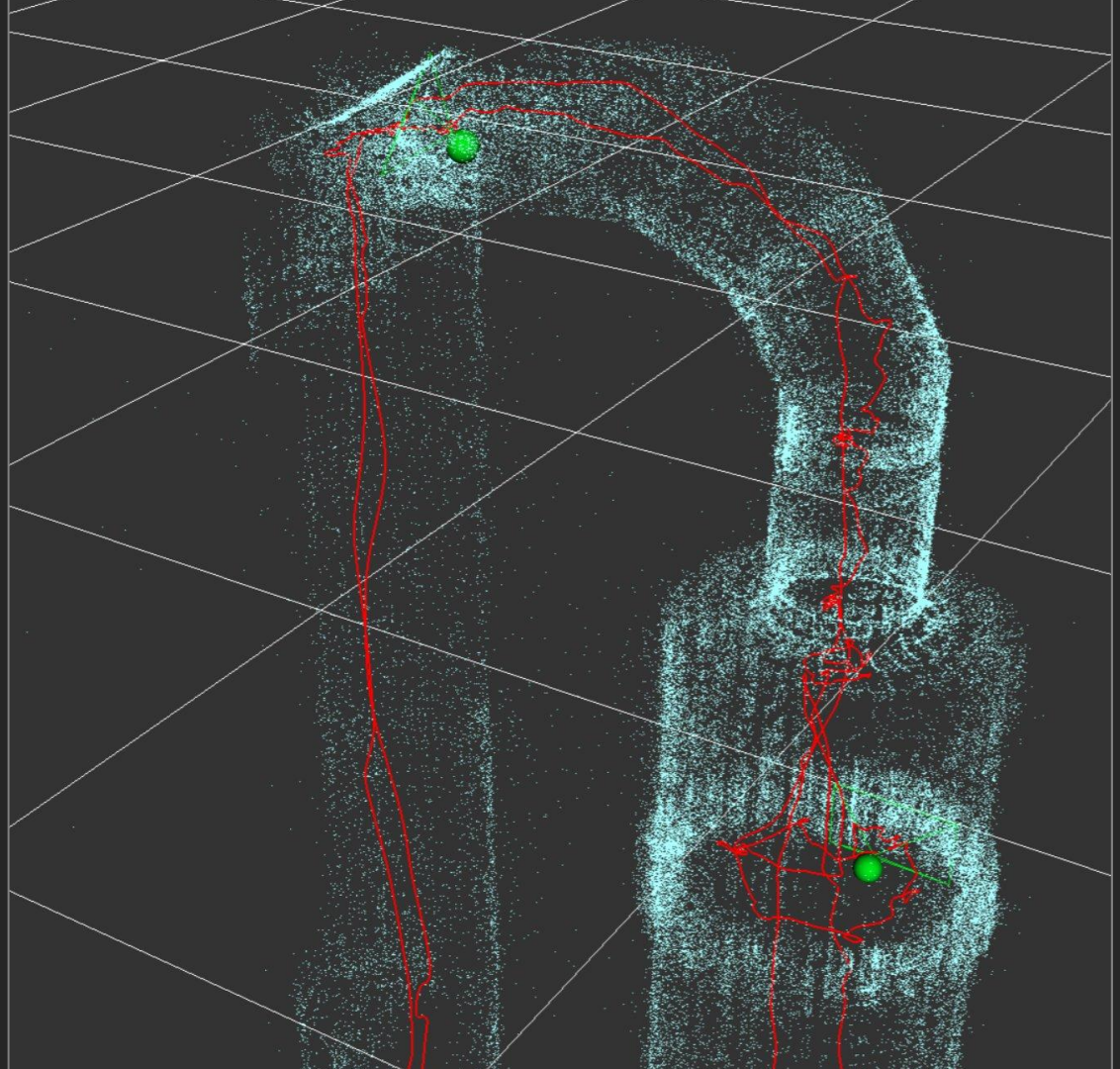
Sewer inspection

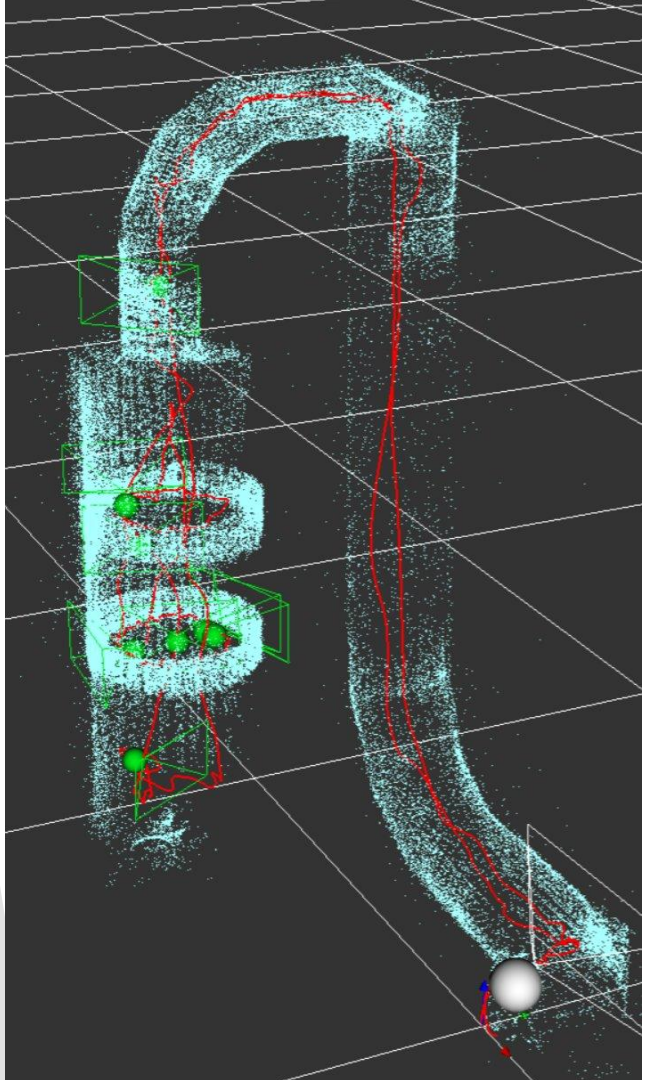


- Measure horizontal distances
- Precisely locate defects and other features

Post-mission analysis

Vessel modelling

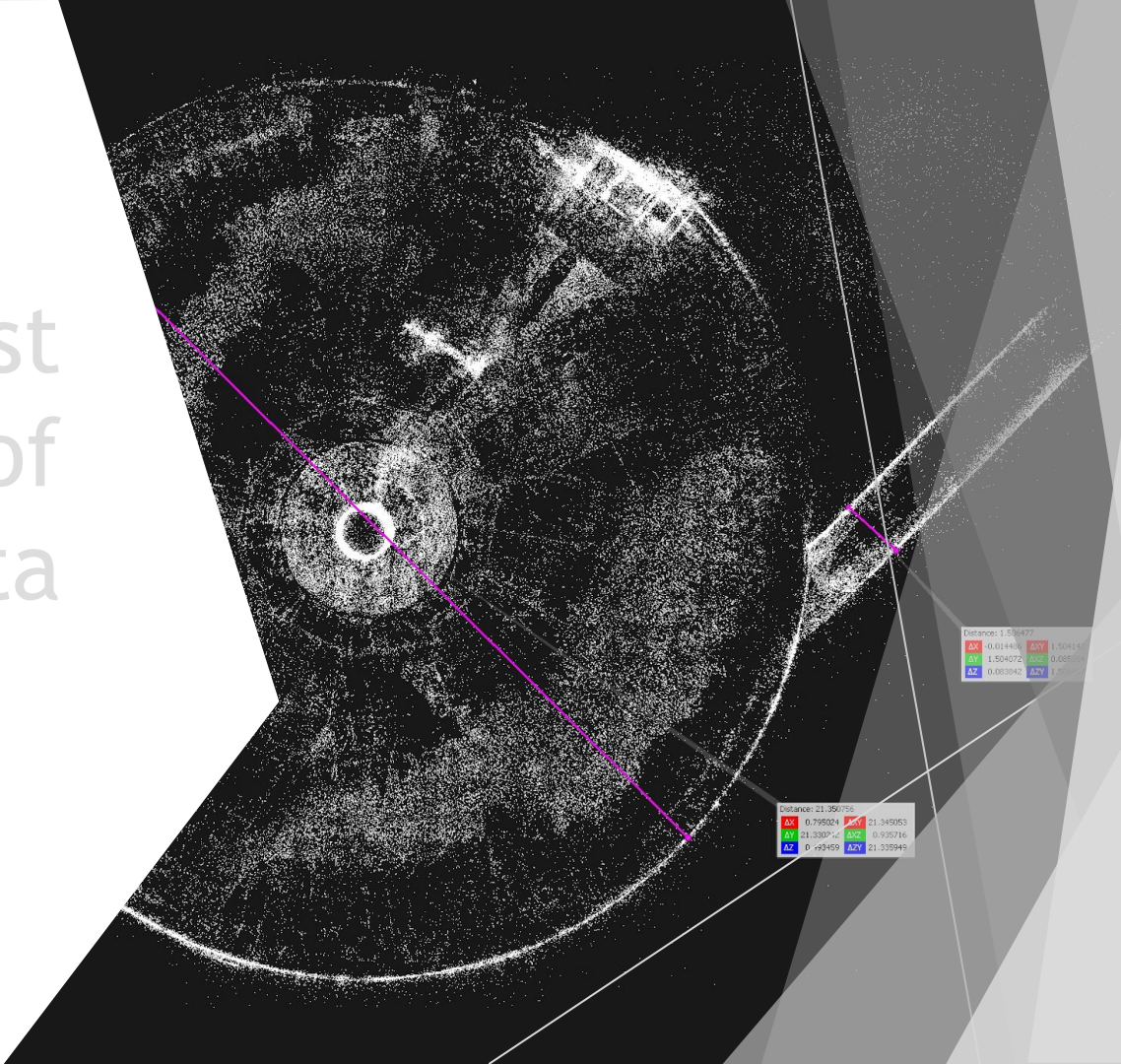


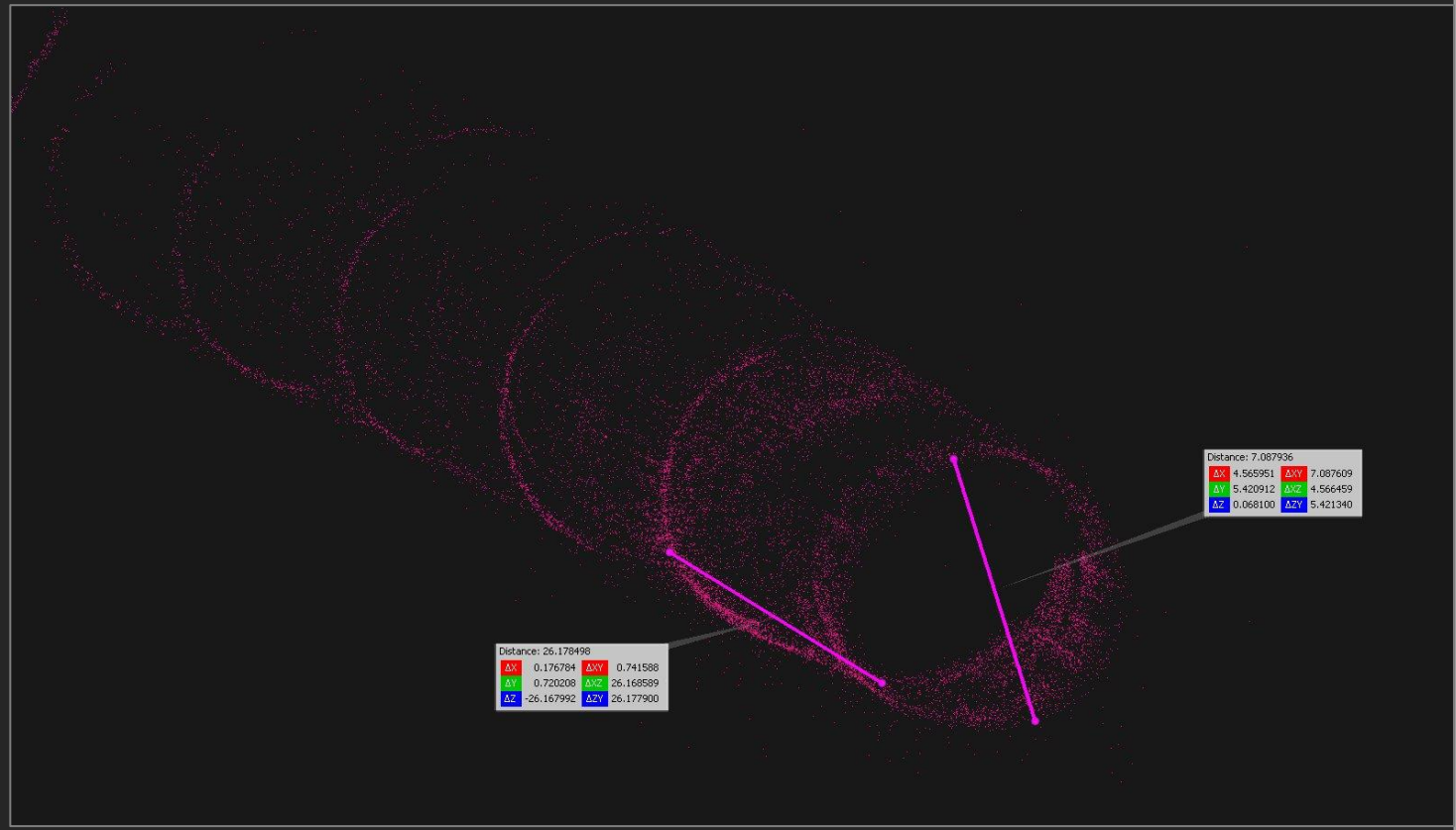


Hydrogen reformer inspection

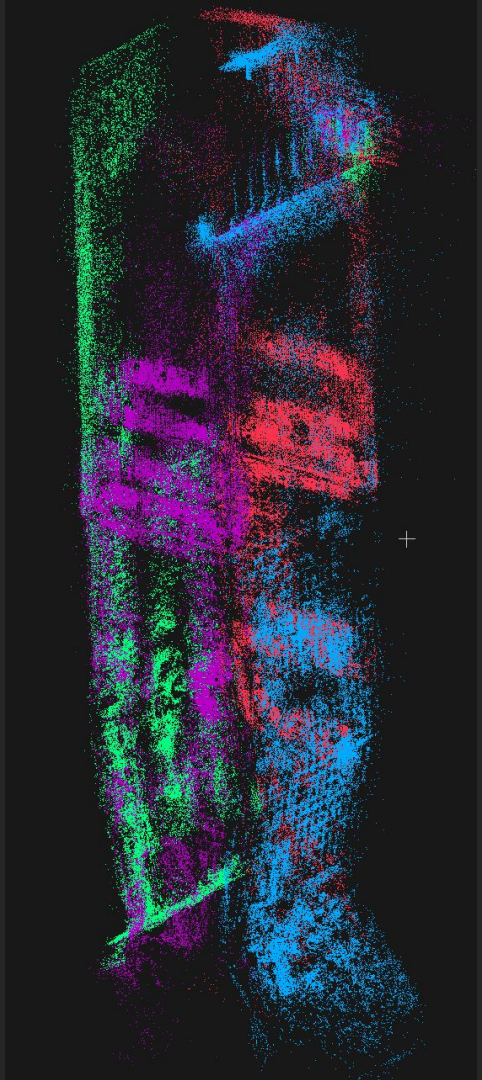
- Detailed enough to make out single tubes and openings
- Numbering of tubes with much less effort than before
- Better visual documentation for recurring inspections

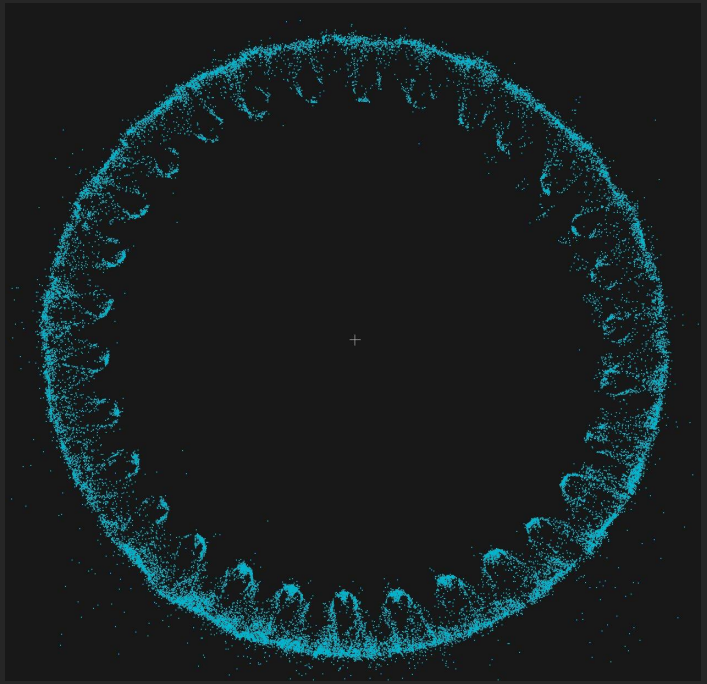
Post processing of data



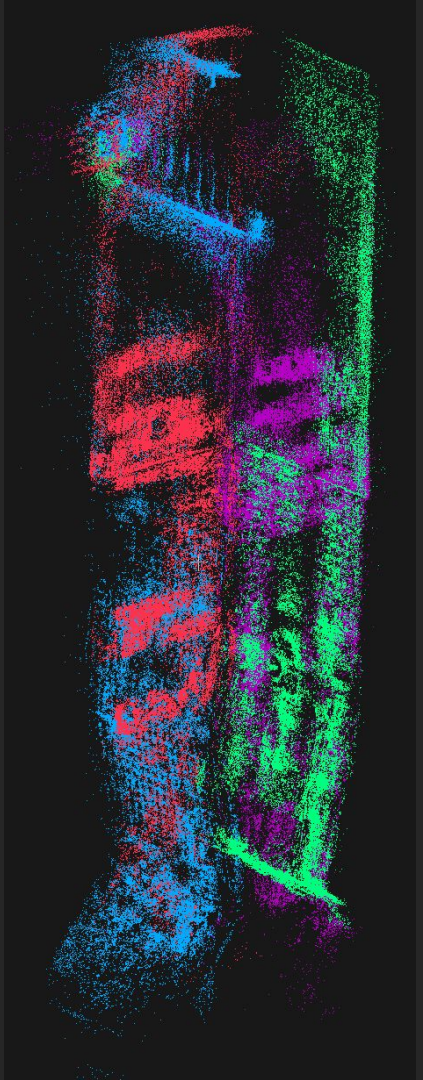


Take measurements

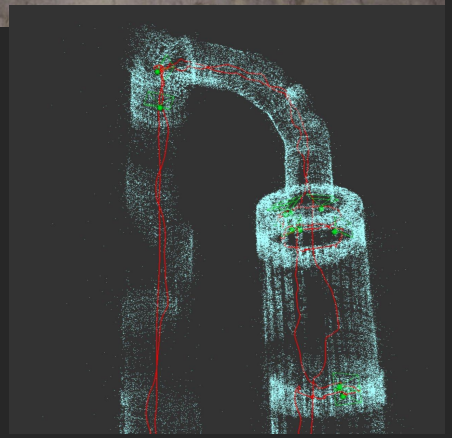




Analyzing the pointcloud



Case study—Hydrogen reformer inspection



Objective

To remotely inspect a hydrogen reformer.

Outcomes

- **Data localization**. Inspector 3.0's sparse 3D models helped inspectors return quickly and easily to the location of defects seen in the visual data.
- **Reduced downtime**. Several hours saved from avoiding manual location of defects.
- **Access**. The hydrogen reformer is lined with fragile ceramic fiber, making it almost impossible to enter. Inspectors used the Elios 2 to collect the visual data they needed to complete the inspection.

The Importance of Data Localization: How Inspector 3.0 Works

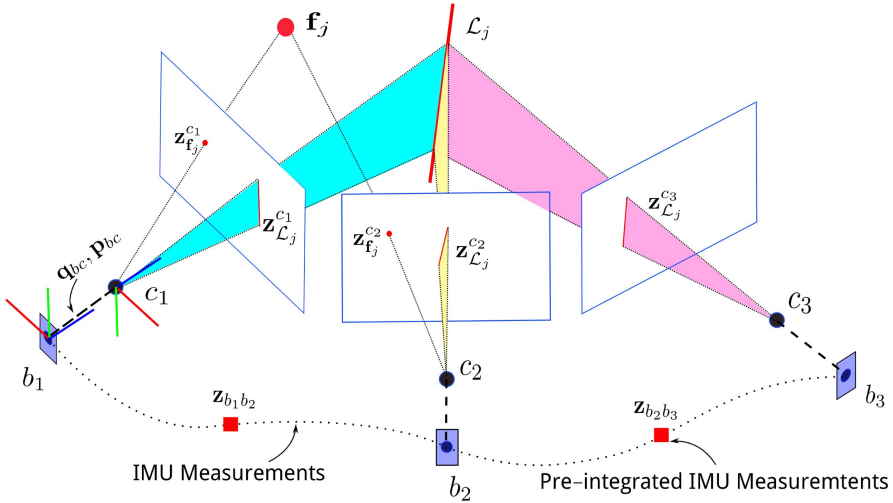
Geoffroy le Pivain
Product Manager

FLYABILITY

VIO what?

Underlying algorithm/engine on which Inspector 3.0 is based

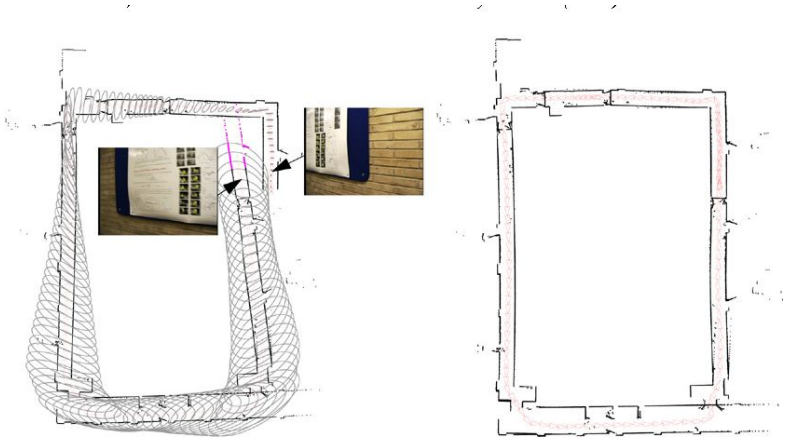
Step 1. Tracking



Requirements

1. **No cage** - Don't look completely down (maximum 30 deg)
2. **Keep good image quality** - good lighting & keep drone 20cm - 5m from walls
3. **Avoid collision**

Step 2. Optimizing

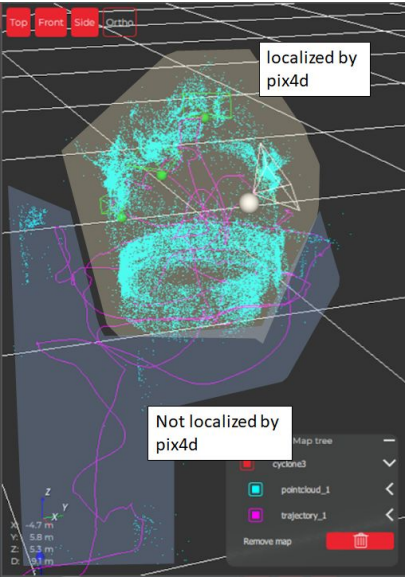


(a) (b)

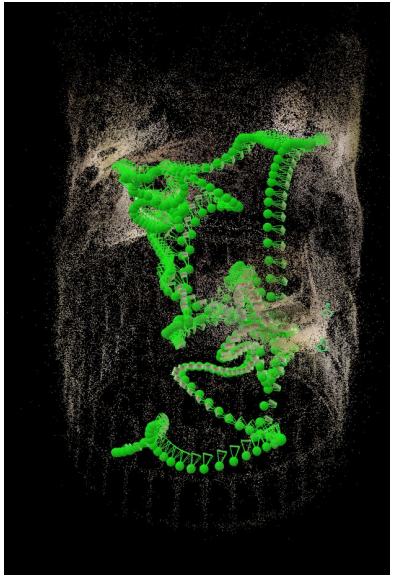
Requirements

1. **Loop closure** - Take off and land looking exactly at the same things

Photogrammetry vs Inspector 3.0



Inspector 3.0 pointcloud + trajectory



Photogrammetry pointcloud + trajectory

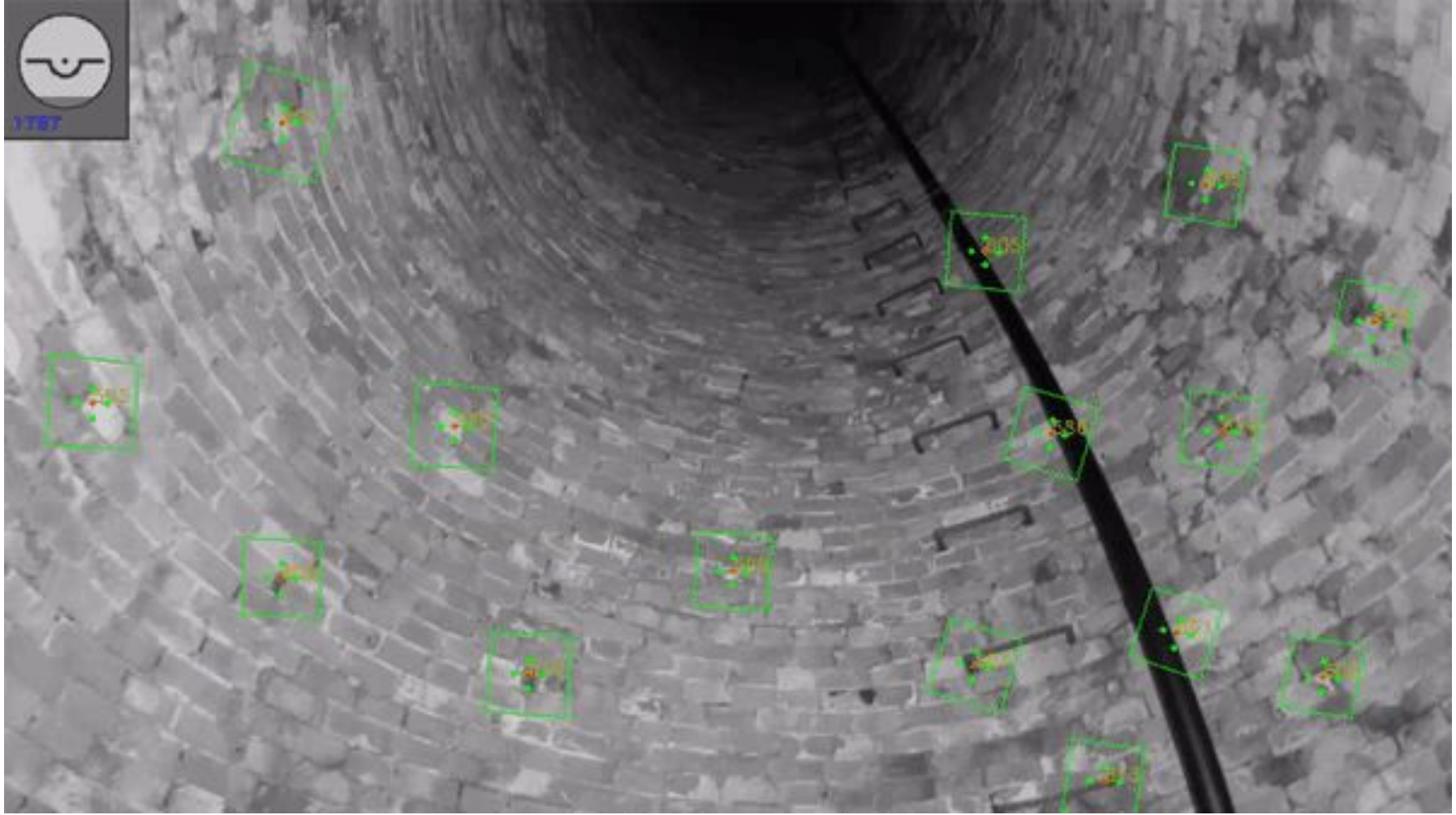
Photogrammetry mesh

	Inspector 3.0	Photogrammetry
Output	Sparse pointcloud Trajectory	Dense pointcloud 3D meshes "Localization" of inputted images
Processing time	Today 30-50min per flight	0.5-1 day for per flight
Actions required	- Click on Map button - Enjoy	- Extracting frames - Creating a project - Fine tuning parameters - Scale the model
Data acquisition	Fly the drone respecting 3 golden rules	Perform a photogrammetric flight

Inspector 3.0 offers more **robust trajectory** in shorter time for **localization** and easily links video with the 3D environment.

Photogrammetry provides nice-looking **dense pointclouds** and **3D meshes**. But requires good piloting skills.

In the future, Inspector 3.0 might be able to ease photogrammetry—Local frame export, pre-localized images, auto-import of photogrammetric models in 3D viewer, etc.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DRONE INSPECTIONS WEBINAR SERIES

—PRESENTED BY FLYABILITY AND MFE—

Thursday, February 11
10:00 AM EST / 4:00 PM CEST

Webinar 1 of 6—The Benefits of Drone Inspections: How Inspectors Are Using Drones to Improve Safety and Save Millions

- Joe Grelewicz, Middough, Inc.
- Mike Vanovermeir, MFE Rentals

Thursday, February 25
10:00 AM EST / 4:00 PM CEST

Webinar 2 of 6—Drone Inspections: Insourcing vs. Outsourcing Your Drone Inspection Program

- Nick Hardwood, MISTRAS Group, Inc.
- Zacc Dukowitz, Flyability

Thursday, March 18
10:00 AM EST / 4:00 PM CEST

Webinar 3 of 6—Indoor Drone Inspections: Case Studies & Best Practices from the Field

- Nick Hardwood, MISTRAS Group, Inc.
- Zacc Dukowitz, Flyability

Thursday, April 1
10:00 AM EST / 4:00 PM CEST

Webinar 4 of 6—Outdoor Drone Inspections: Case Studies & Best Practices from the Field

- Courtland Penk, Osprey Integrity, Ltd.
- Zacc Dukowitz, Flyability

Thursday, April 15
10:00 AM EST / 4:00 PM CEST

Webinar 5 of 6—Drone Inspections: How to Manage Data for All Stakeholders Involved

- Dustin Waller, Occidental Petroleum
- Danny Landry, Premium Inspection & Testing

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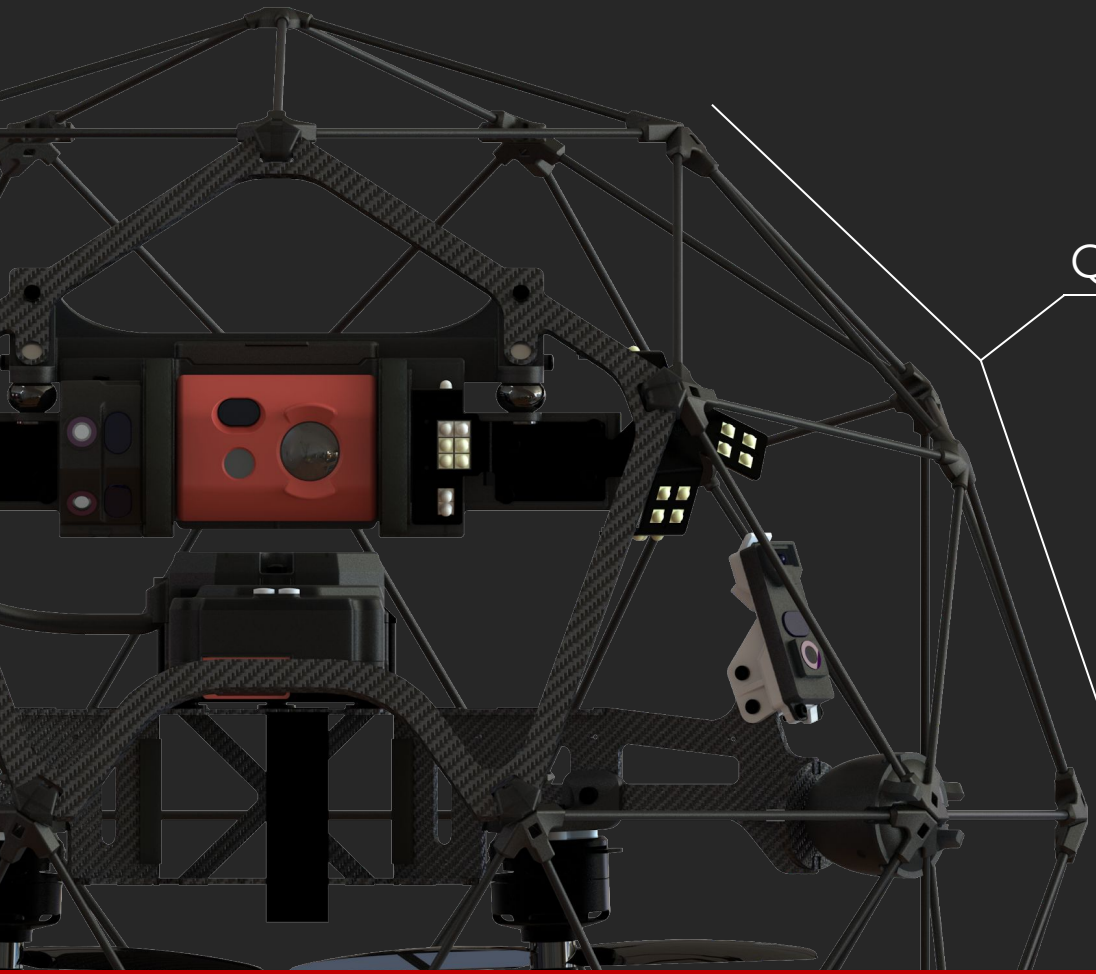

Q&A

Send your follow-up questions to:

Simon Kumm, InspecDrone—
simon.kumm@inspecdrone.eu

Geoffroy le Pivain, Flyability—
geoffroy.lepivain@flyability.com

Johan Mlouka, Flyability—
johan.mlouka@flyability.com

Zacc Dukowitz, Flyability—
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