Human in the loop autonomy software

Providing data for humans and for robots

RTS & NOSP Subsea Innovation Day

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RTS & NOSP SID 2025

Human in the loop autonomy

It's all about data

- What is AI?
- EIVA initiatives in AI
- NaviSuite 5
- ROV autonomy

AI?

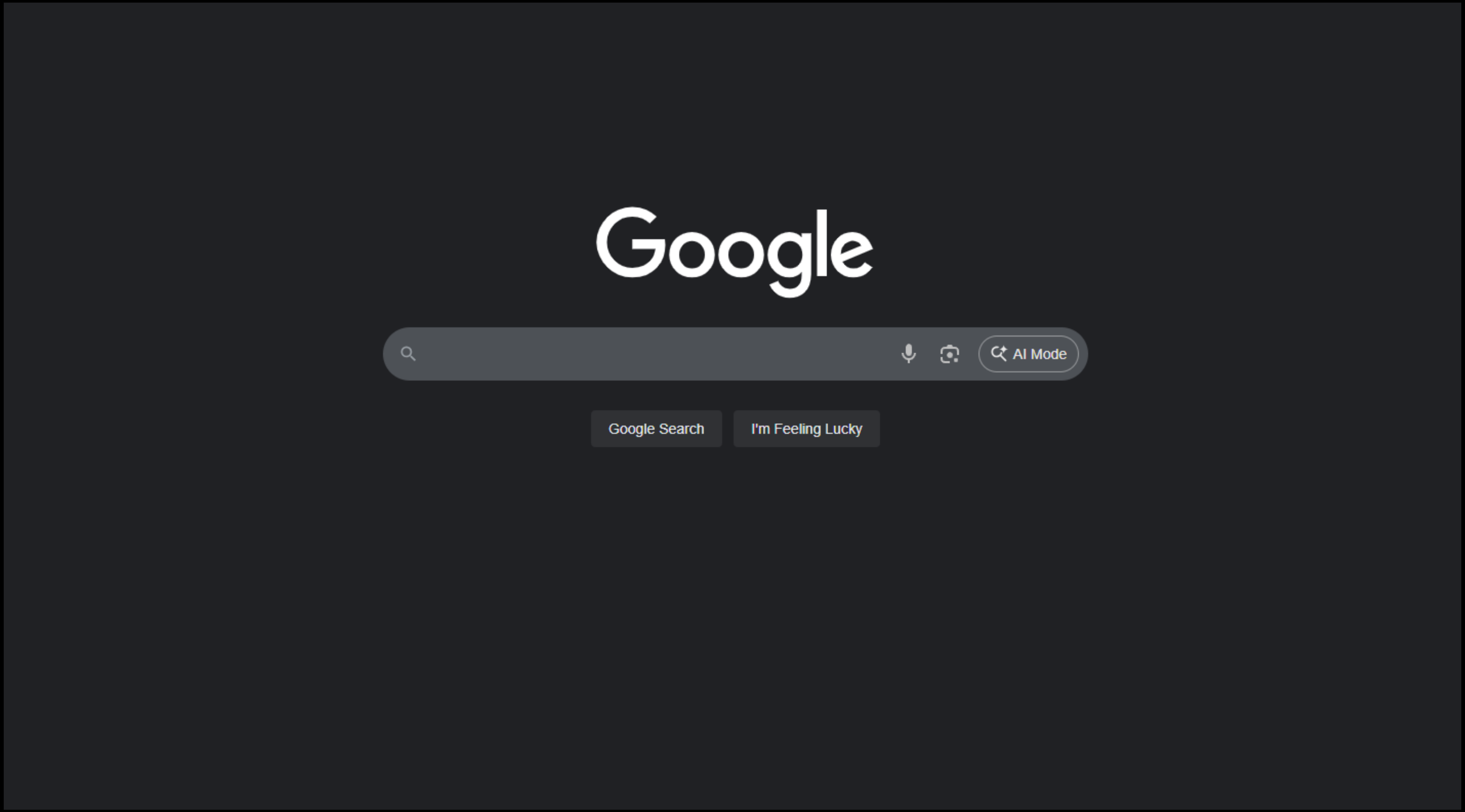
Prompt: generate an image of an offshore marine surveyor working side by side with a robot

AI?

AI?

Learning usage patterns to recommend shows

AI?



Finding stuff in milliseconds from the vastness of the internet, giving you recommended results

WHAT IS AI?

AI Overview

Artificial Intelligence (AI) refers to systems and computer programs that can perform tasks typically requiring human intelligence, such as learning, problem-solving, and decision-making. It is an umbrella term for various algorithm-based technologies designed to interpret data, generate realistic human-like output, and act in the digital or physical world to achieve complex goals.

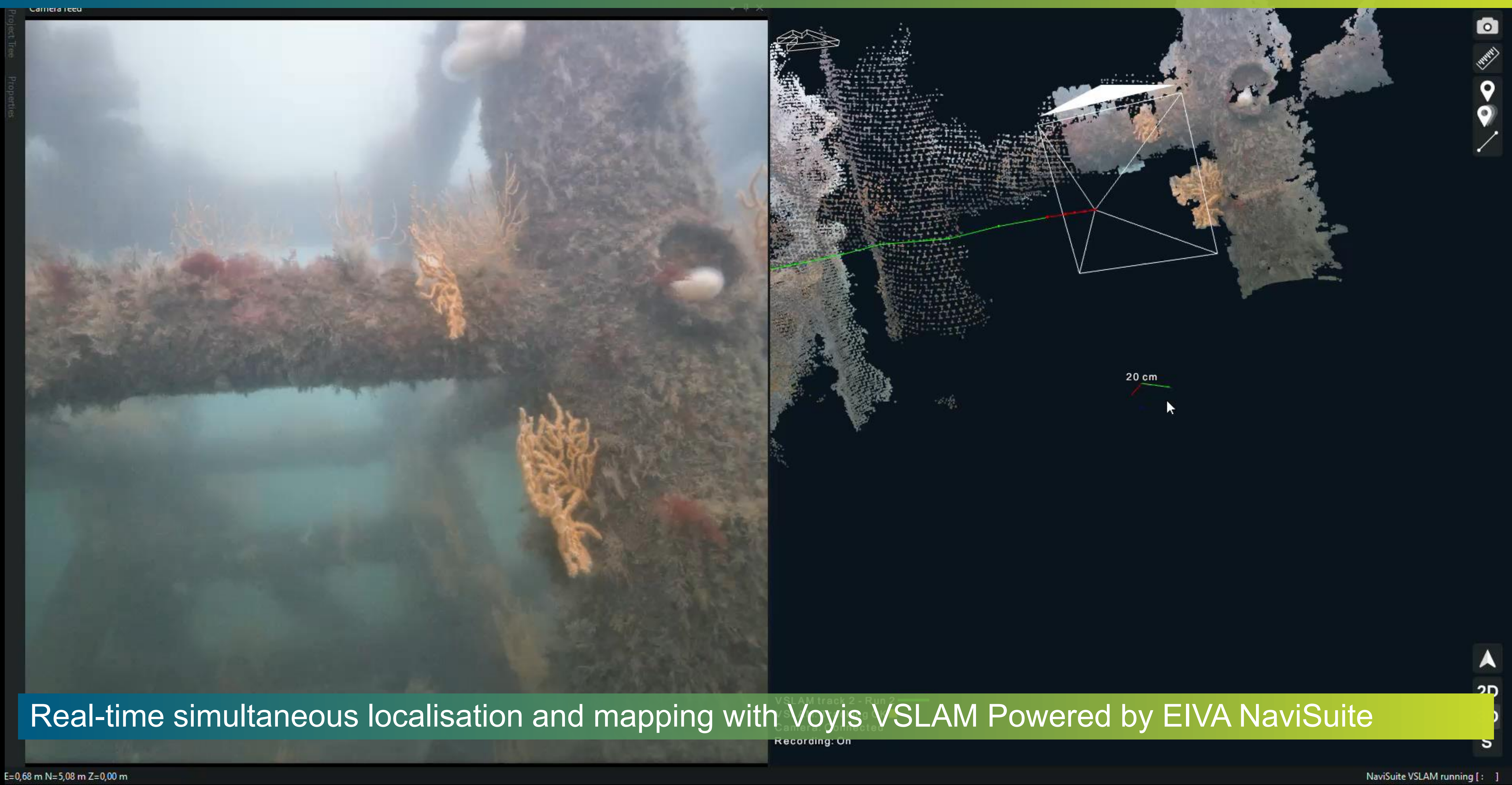
Let’s just ask the very man (or robot)

AI?

Name	Import in NE	Link SVP	Calculate GPS Height	Create Raw DTM	Cell Stats before Cleaning	Write 'before stats' to file	NM Raw -> Cleaned	EC3D Cleaning	Cell Stats after Cleaning	Write 'after stats' to file	Reject Fraction Stats	Write 'reject %' to file	Write Back to NE	Set Property	Create full DTM	Completion Time
0034_20210703_181323_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	3 min, 31 sec
0035_20210703_181407_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	3 min, 24 sec
0036_20210703_181506_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 min, 20 sec
0037_20210703_181516_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5 min, 32 sec
0038_20210703_181544_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5 min, 43 sec
0039_20210703_181731_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	6 min, 8 sec
0040_20210703_181933_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 min, 20 sec
0041_20210703_181940_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	3 min, 28 sec
0042_20210703_181947_Bintang.all	✓	✓	✓	✓	✗	⌛	⌛	⌛	⌛	⌛	⌛	⌛	⌛	⌛	⌛	
0043_20210703_181954_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 min
0044_20210703_182005_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	6 min, 19 sec
0045_20210703_182205_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5 min, 52 sec
0046_20210703_182355_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5 min, 45 sec
0047_20210703_182528_Bintang.all	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5 min, 42 sec

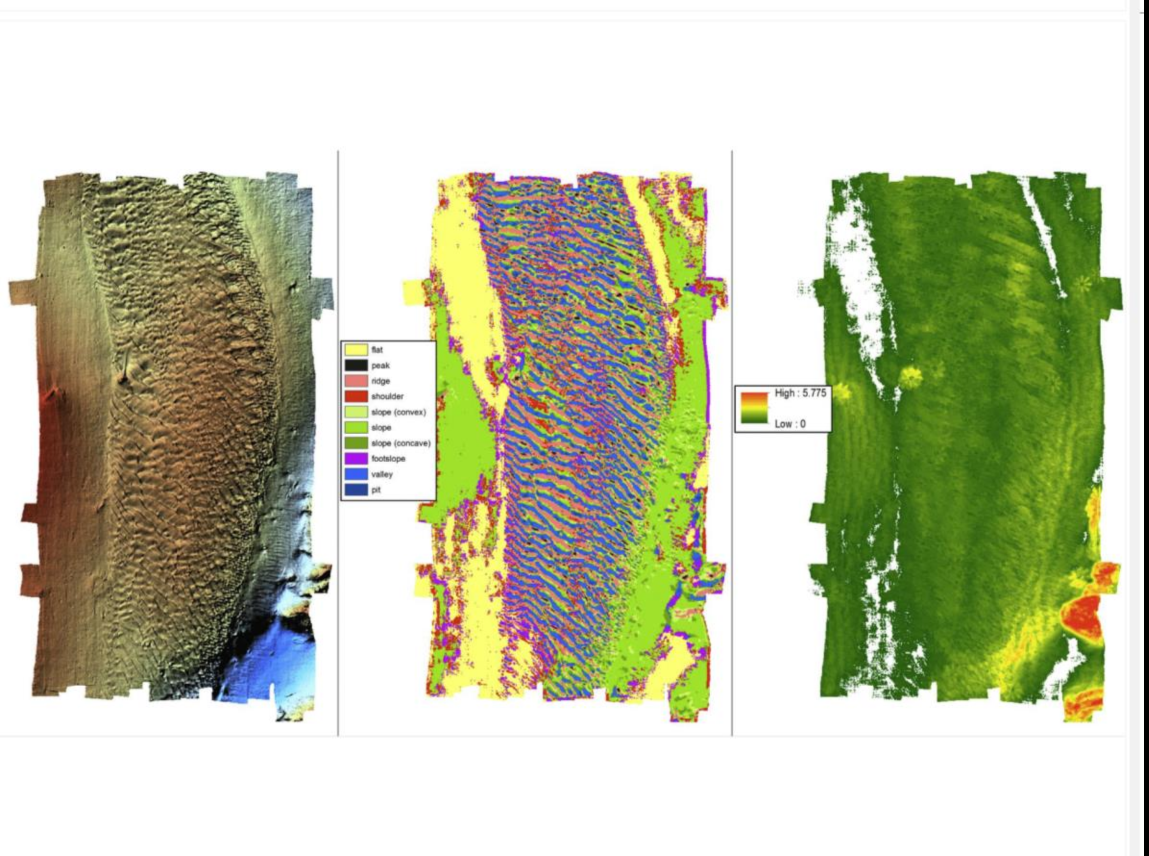
EIVA Workflow Manager Automated Line Processing

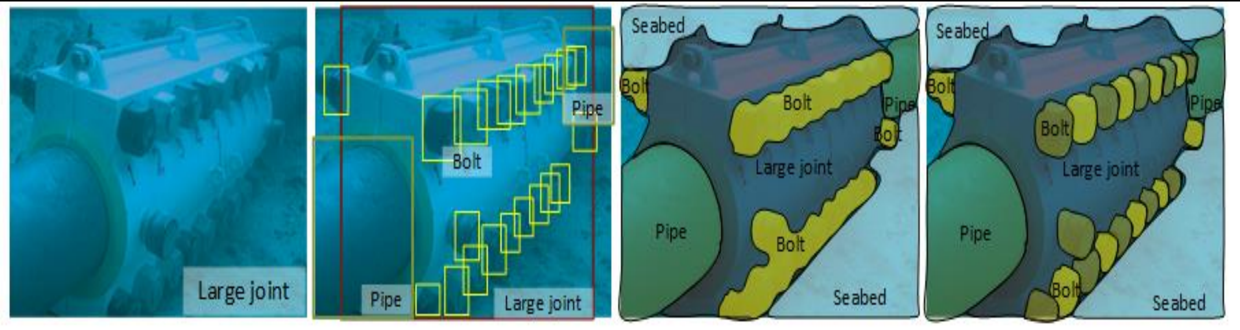
AI?



Real-time simultaneous localisation and mapping with Voyis VSLAM Powered by EIVA NaviSuite

AI?





Automated feature classification

The shit in / shit out dilemma

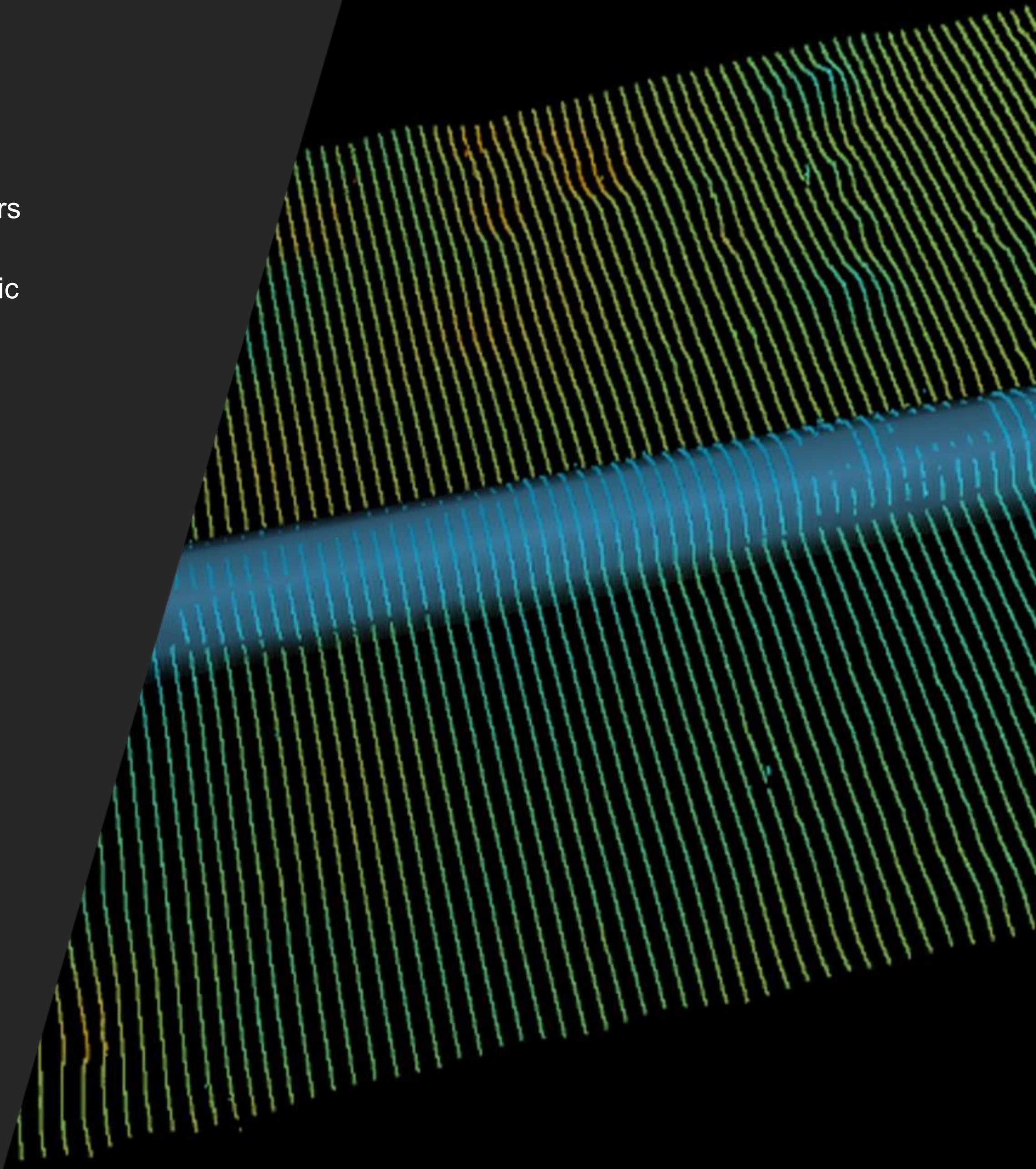
Challenges of AI models

- Difficulties to access datasets to train a model, as well as excessive number of man-hours to annotate data and train models
- Creating a universal model is a daunting task with current technology, focusing on specific assets is more effective
- A lot of data is required to generate capable models
- To create a model that could apply across different assets, data needs to be captured in very similar conditions
- Many false positives are found, which might be too time consuming to QC

EIVA is researching ways to make data training faster and more effective

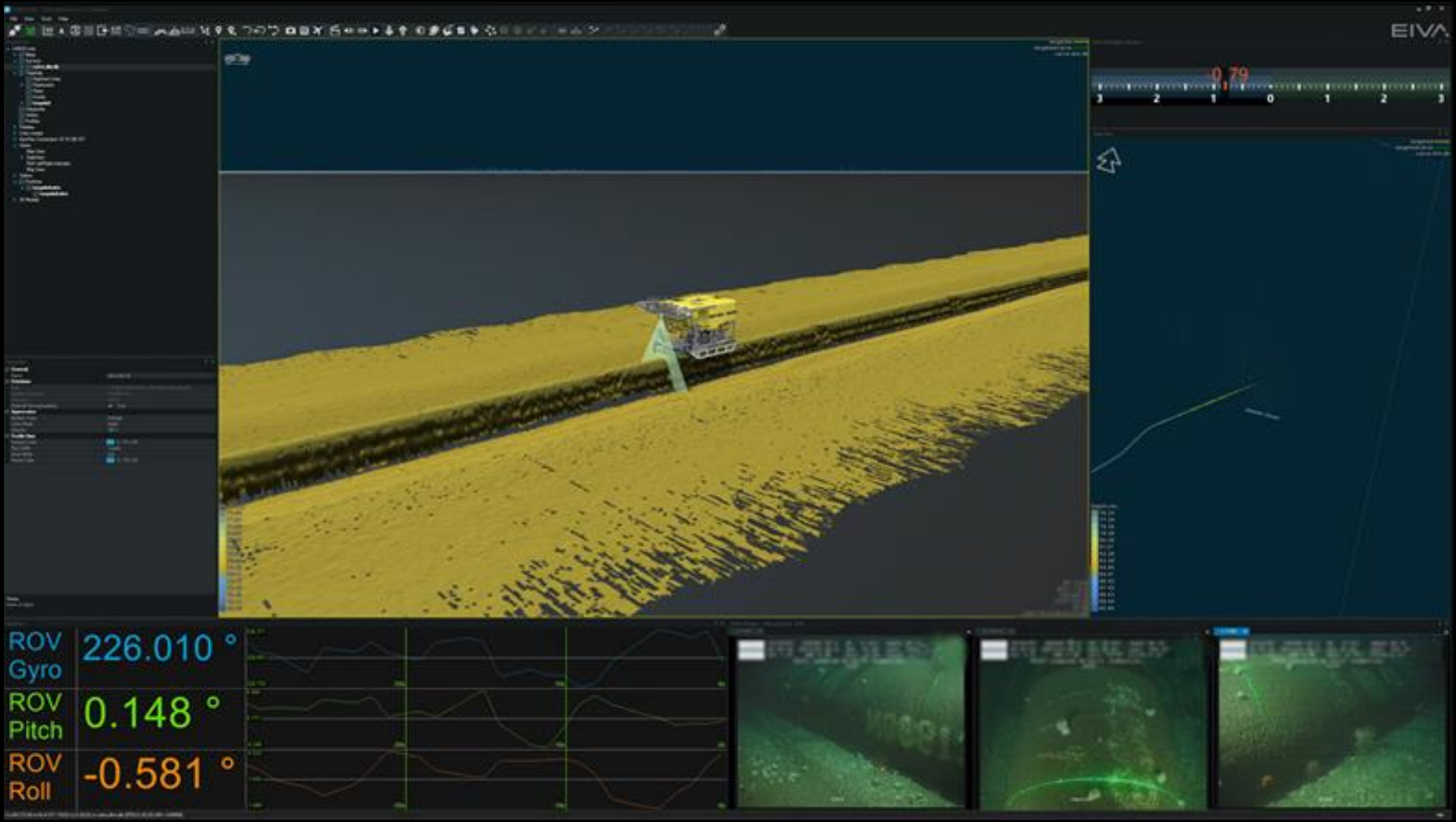
But we can accept

ACCESS TO DATA IS KEY



Did somebody say DATA?

DATA DATA DATA



EIVA’s NaviSuite is the data modelling tool that surveyors love

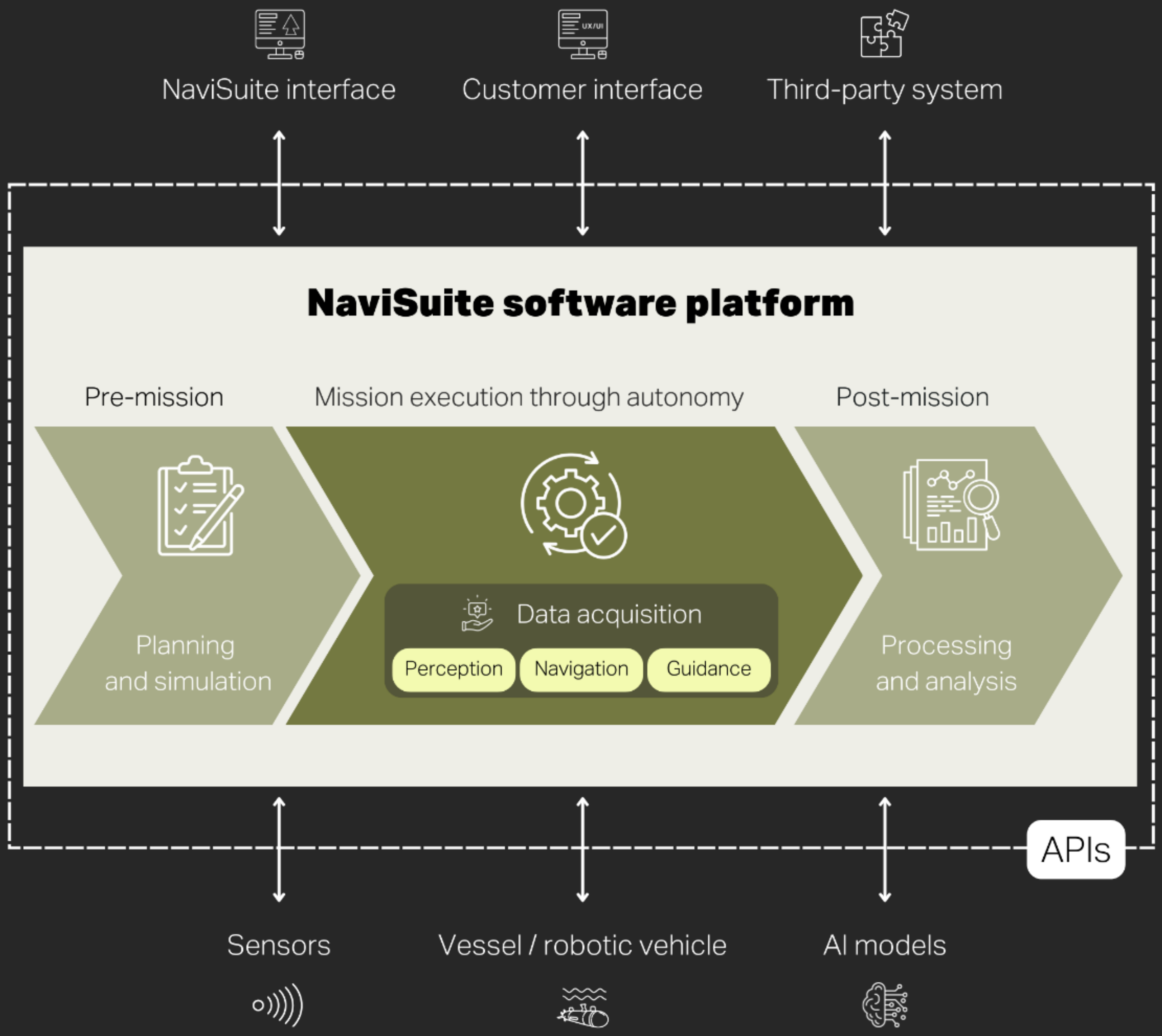
Data for the human
and the robot

NaviSuite 5

Architecture overview

Open and modular architecture supporting full-stack deployment

… while allowing you to extend and tailor to your needs with APIs



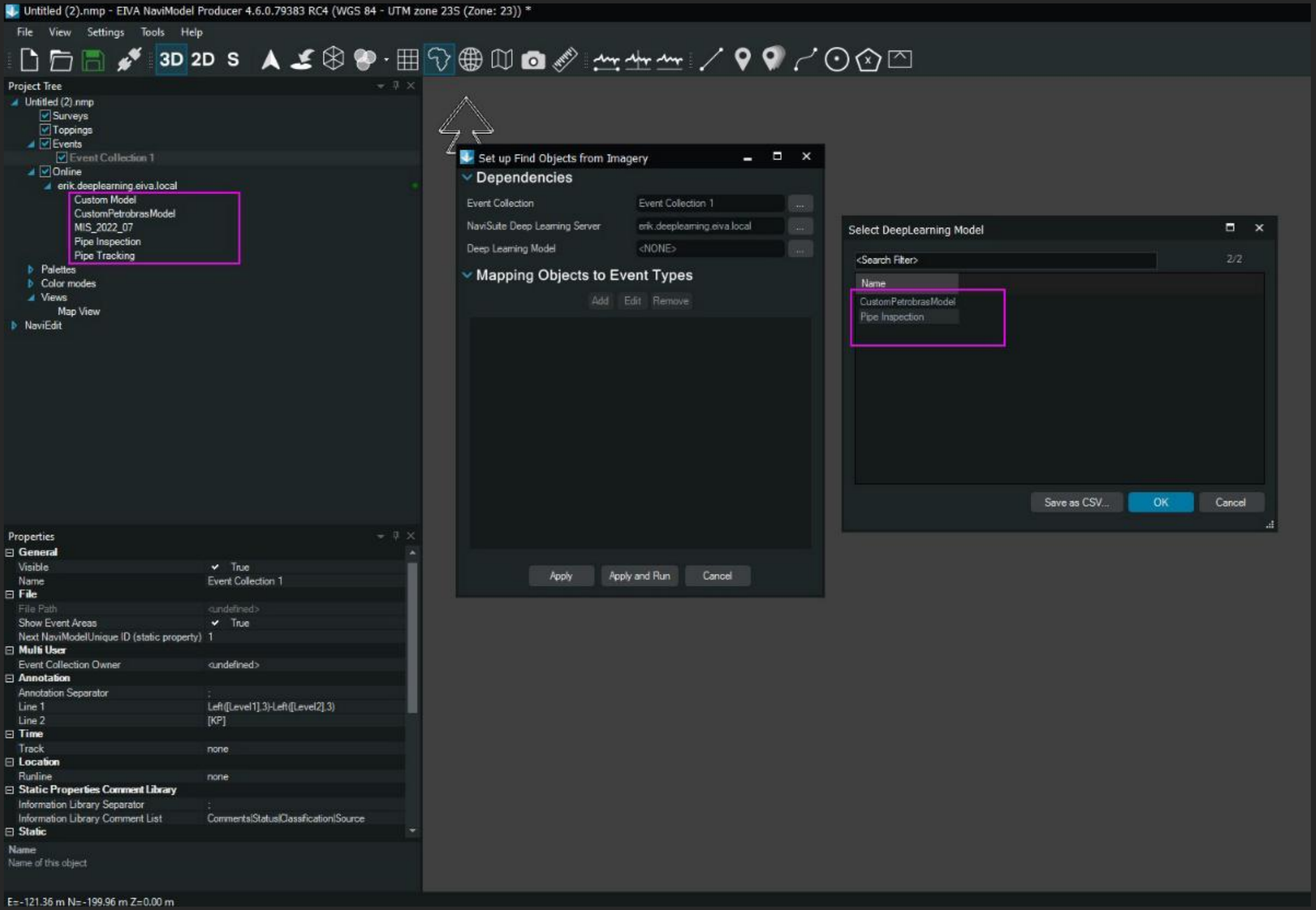
EIVA

Bring your own AI

3rd party AI model integration

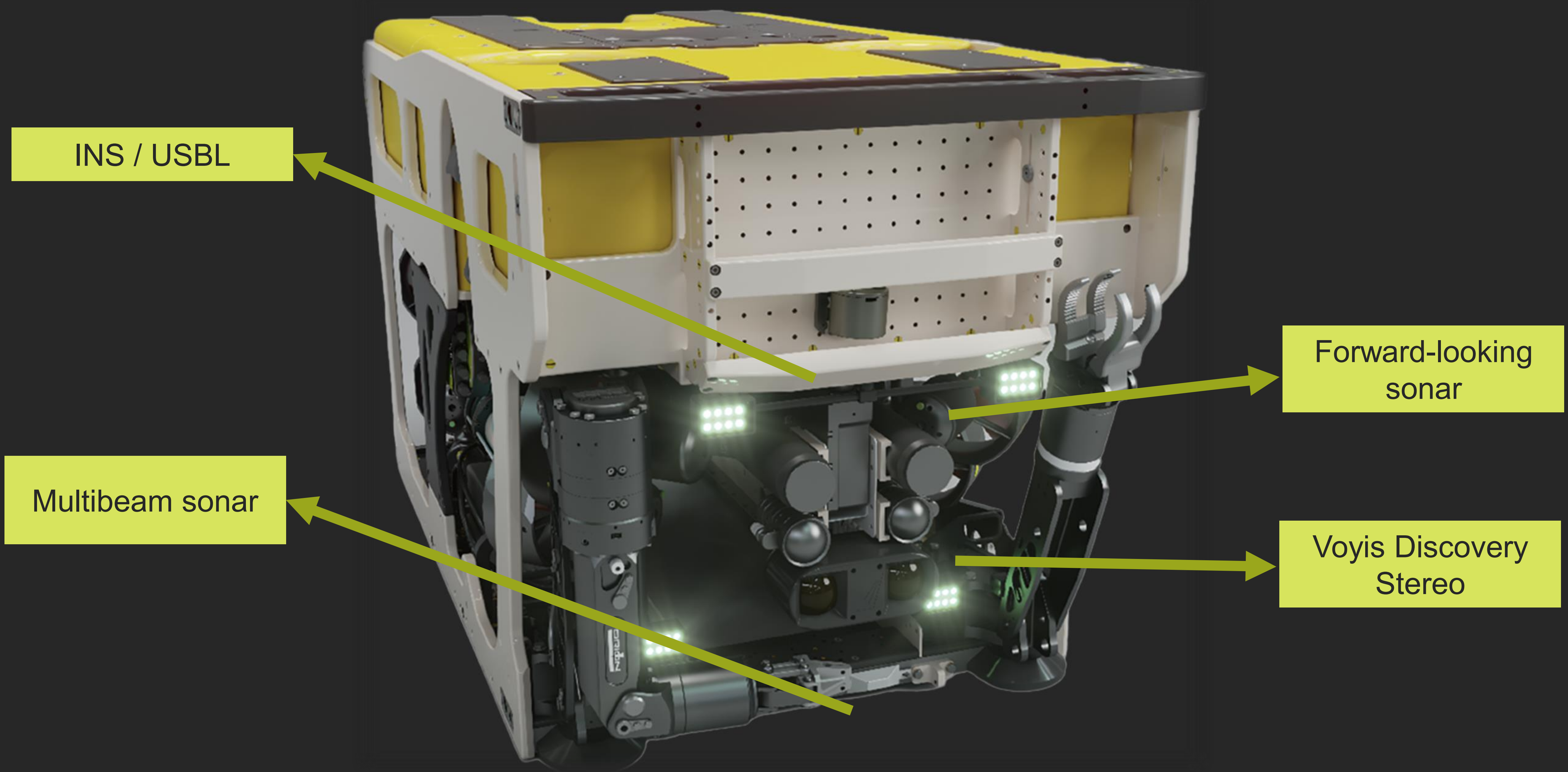
EIVA has already integrated 3rd party AI Models from Petrobras and others in NaviSuite for event tagging

We will put this experience to use in NaviSuite 5 giving users the ability to extract data at several points during the survey



EIVA

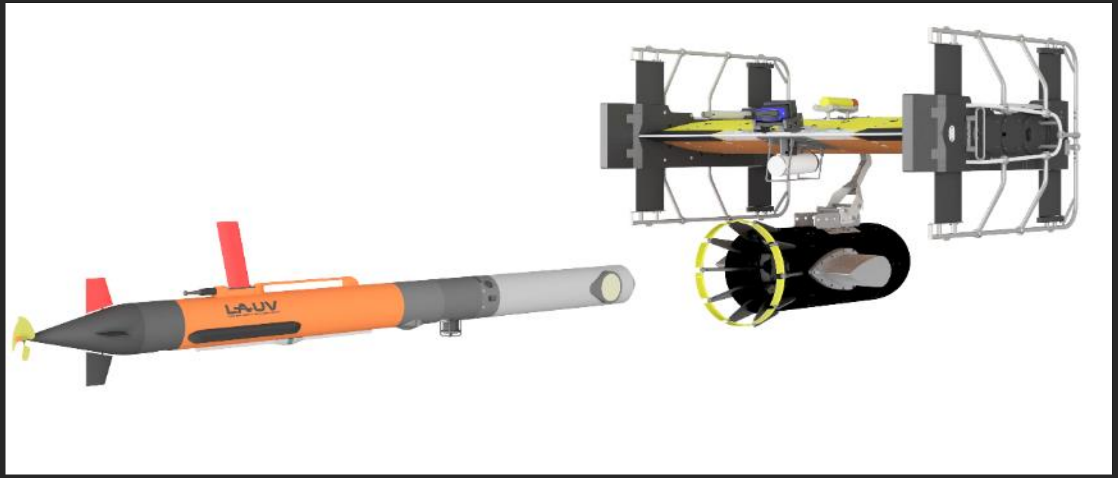
Diving for data



Advanced perception

Sensor fusion for autonomous AUV docking to towhead

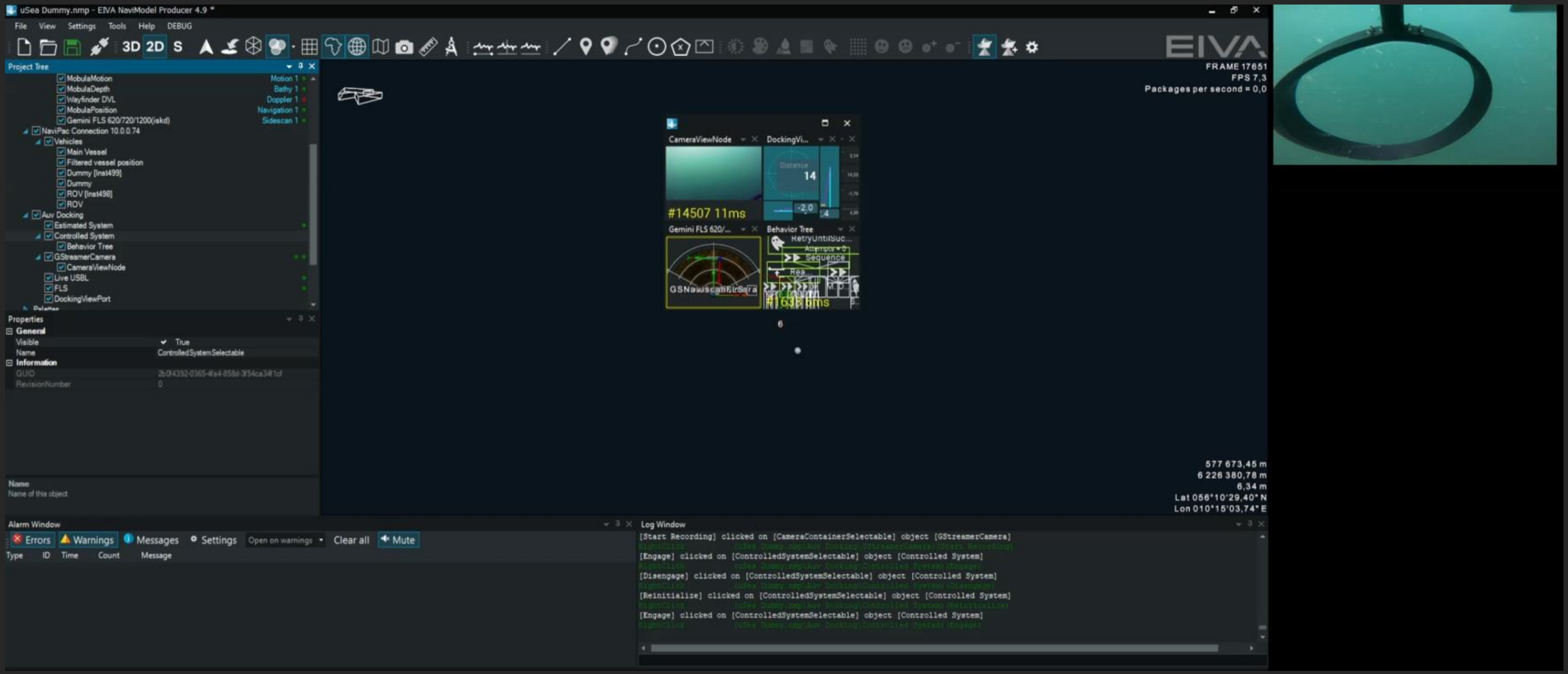
- Subsea docking of AUVs
- Hardware: Winch, ScanFish 3D ROTV and custom designed docking cage
- Sensor fusion of different types of perception sensors
    - USBL
    - Forward looking sonar
    - Camera recognised light patterns (Aruco-like)



Advanced Perception

Sensor fusion for autonomous AUV docking to towhead

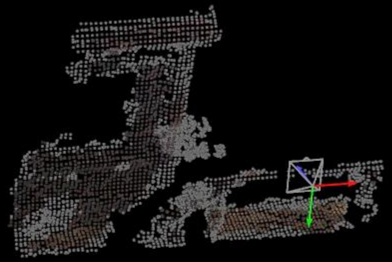
- Autonomous wide area approach of the ScanFish towards AUV using USBL positions of AUV and ScanFish
- Leveraging perception from FLS, sonar and camera for docking of the ScanFish towards the AUV



EIVA

Diving for data

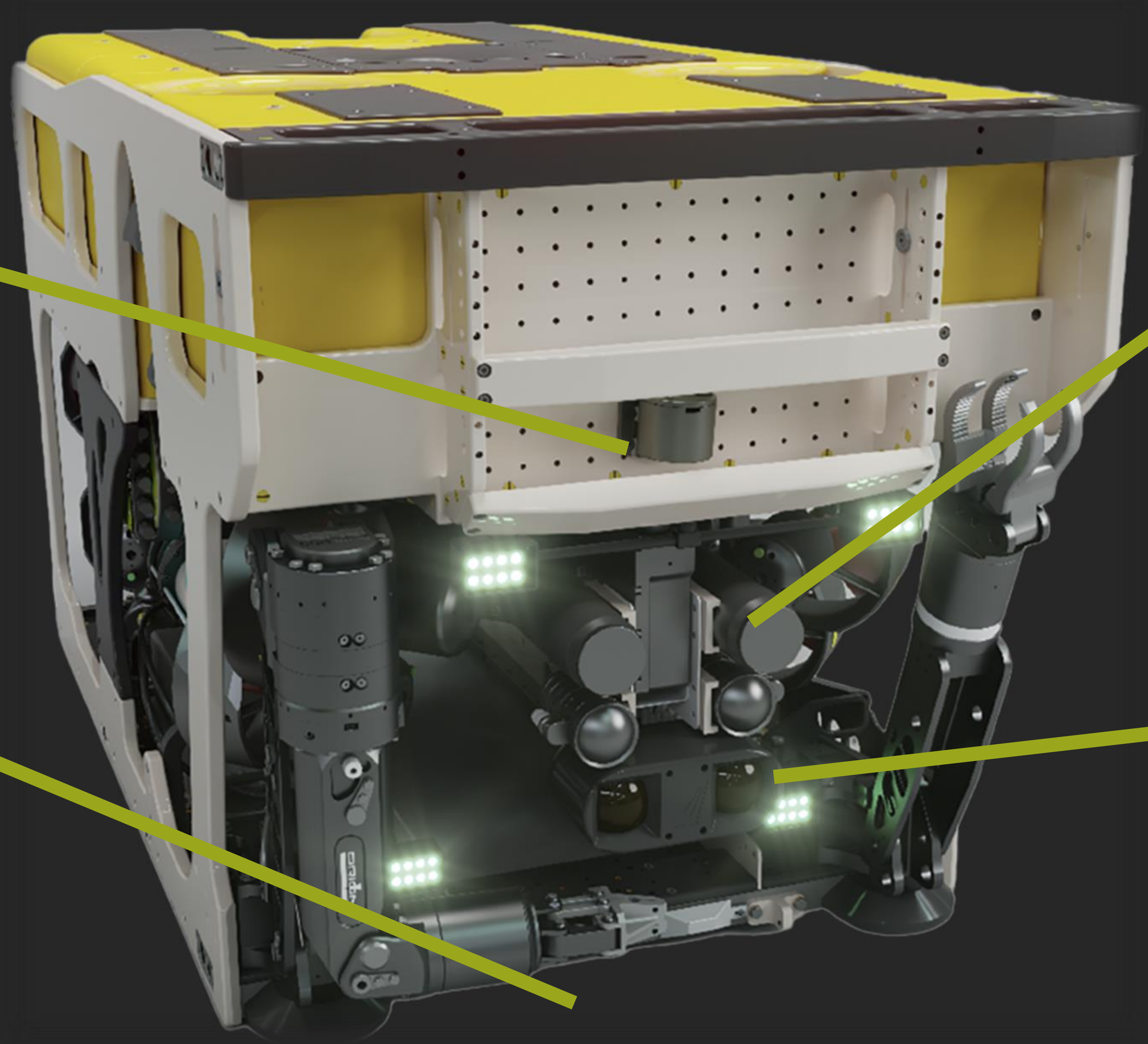
Optimal survey speed and distance to scene



Data for diving

INS / USBL / DVL
Absolute coordinate navigation

Multibeam sonar
Pipe / horizontal asset relative navigation
Seabed mapping navigation



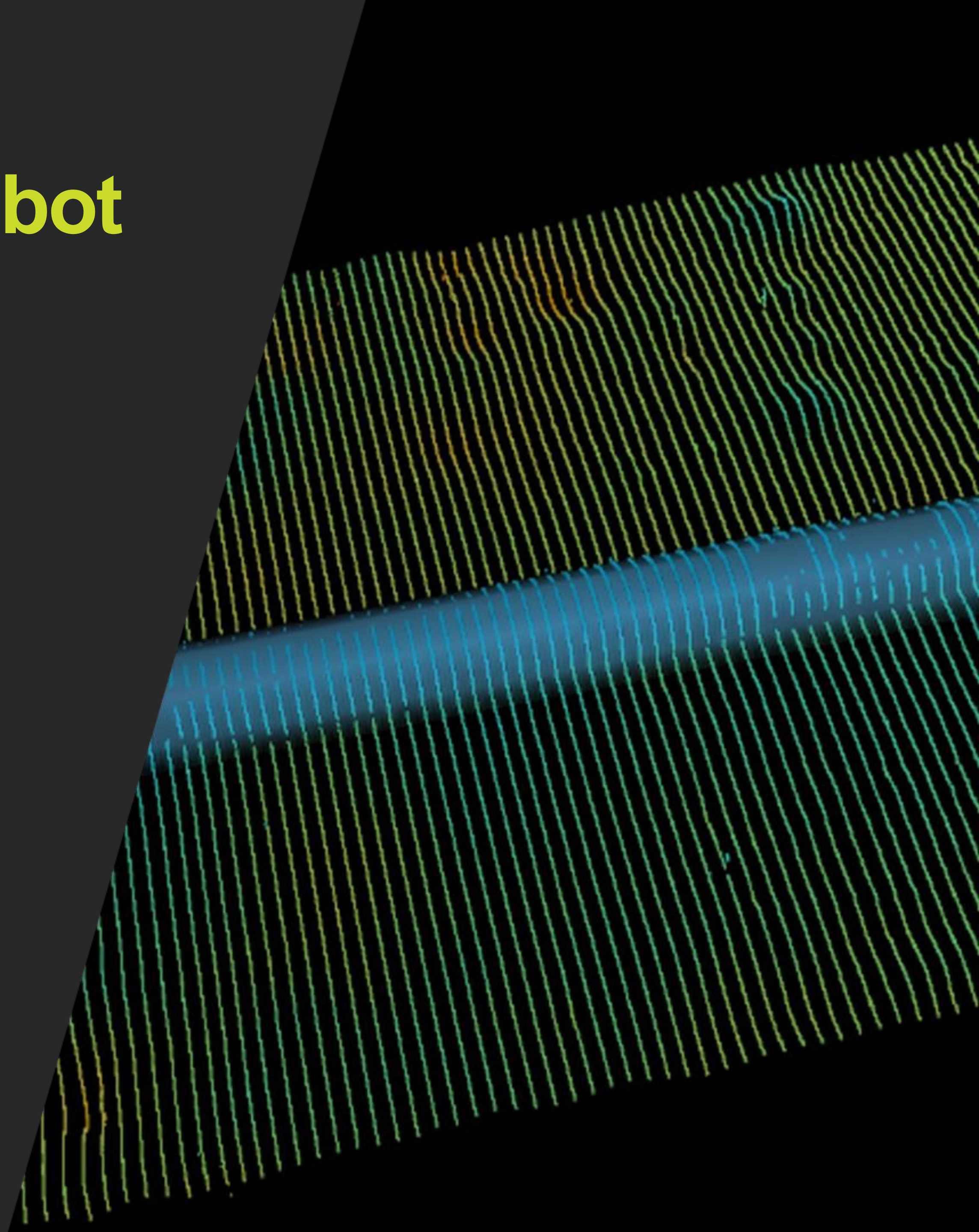
Forward-looking sonar
Collision avoidance

Voyis Discovery Stereo
3D spatial awareness
Stand-off distance keeping
Asset relative navigation

Conclusions

Data for the human and the robot

- Increased industry focus on data-as-a-service
- To achieve autonomy, you need AI, automation but most importantly access to data
- EIVA is turning fragmented raw data into reusable digital models that extend value far beyond the survey / mission
- NaviSuite 5 will enable users to run their custom applications, workflows, AI Models via API
- EIVA empowers people and enables robots:
  - Automation: automating data processing to reduce surveyor's workload
  - Autonomy: providing sensor-fused data to control systems for increasingly autonomous piloting, to reduce the pilot's workload



Thank you

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Add me to your contact list