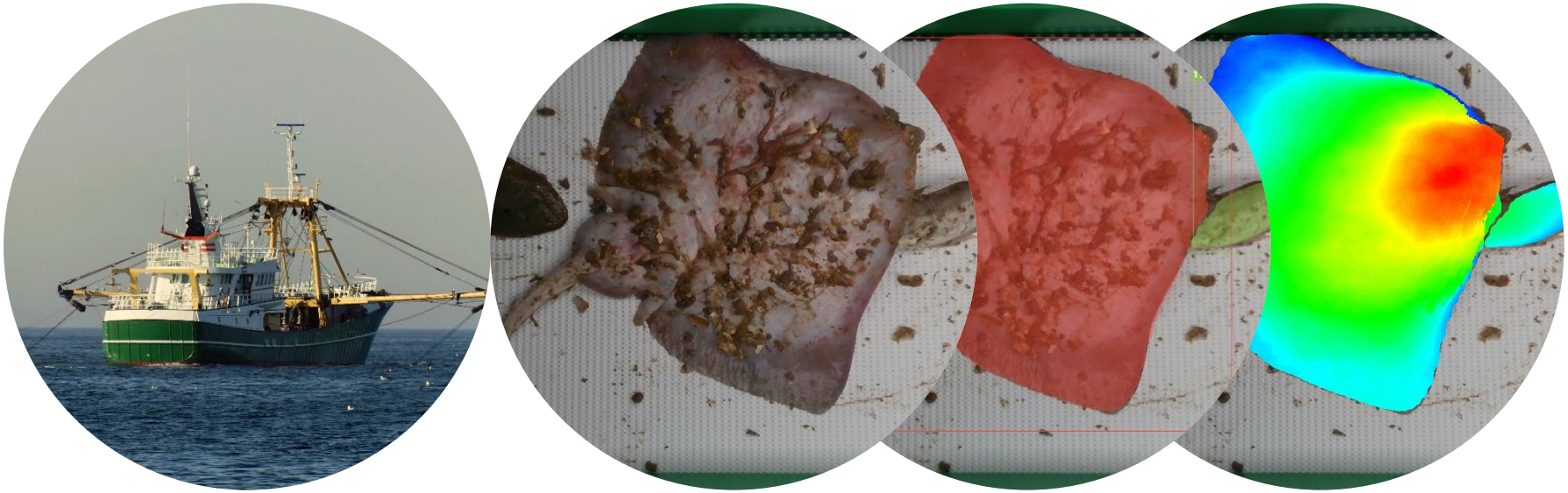
Fully Documented Fisheries

Creating an automated catch registration system for fisheries



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This presentation

- The challenge of catch recording at sea
- The solution
- Improving the solution

The challenge of catch registration at sea

Landings well documented

Part of catch discarded at sea...?

- → **support advice on catch opportunities**
  - **ICES**
- → **support scientific advice**
  - **STECF**
- → **support research Landing Obligation**
  - Discard registration (regulation)

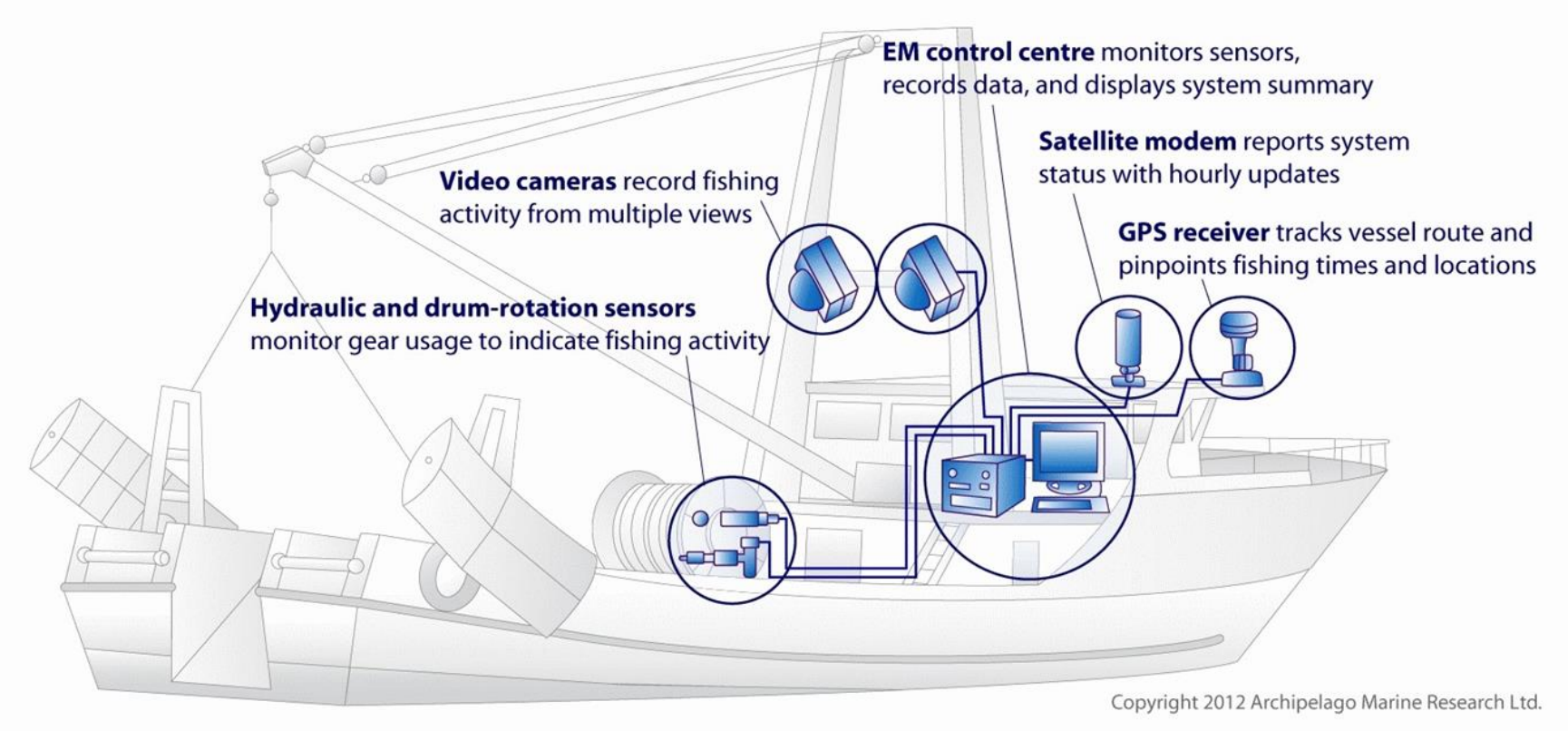
Observers at sea

Accurate identification

Labour intensive:

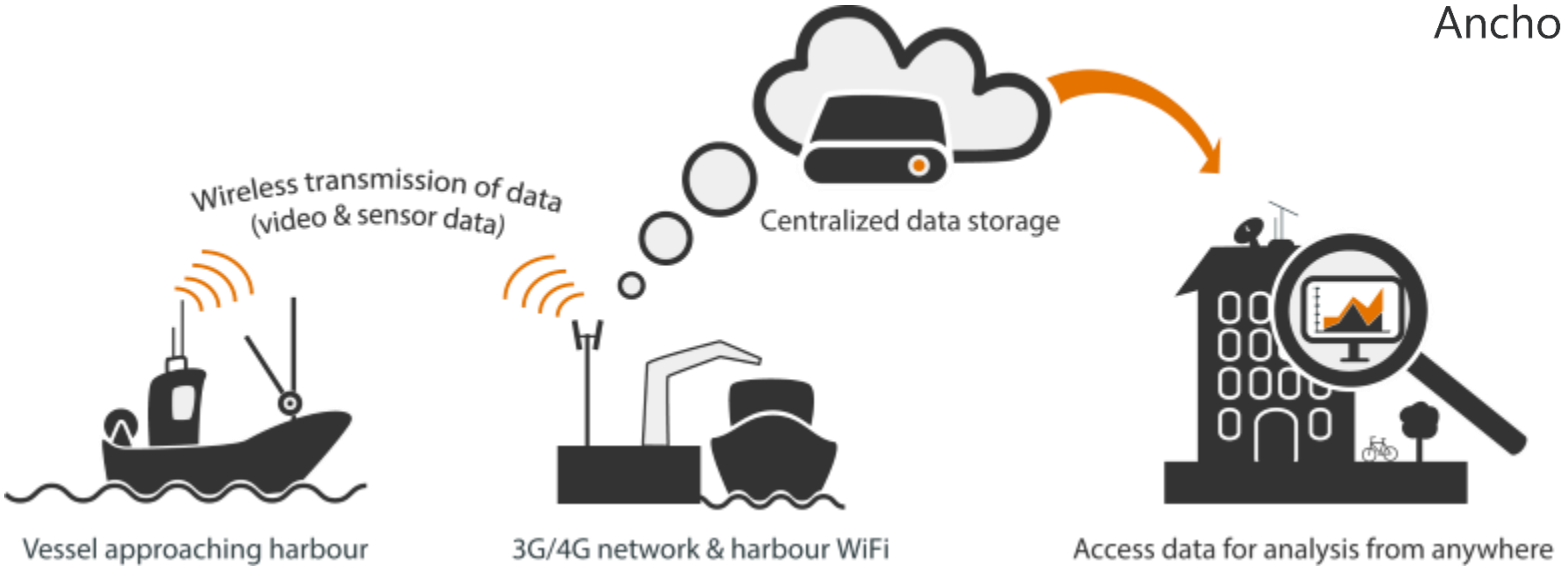
Small sample size
< 5% of total catch
< 1% of fleet

The solution: Electronic Monitoring



Electronic Monitoring

Anchor Lab



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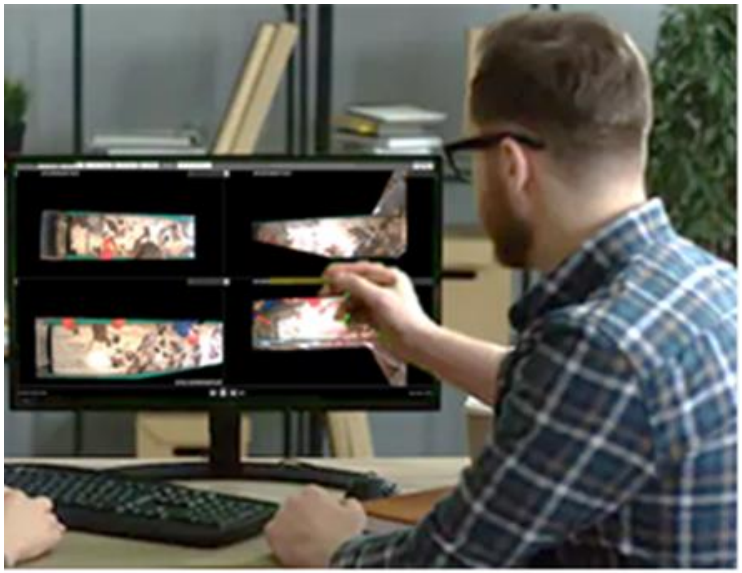
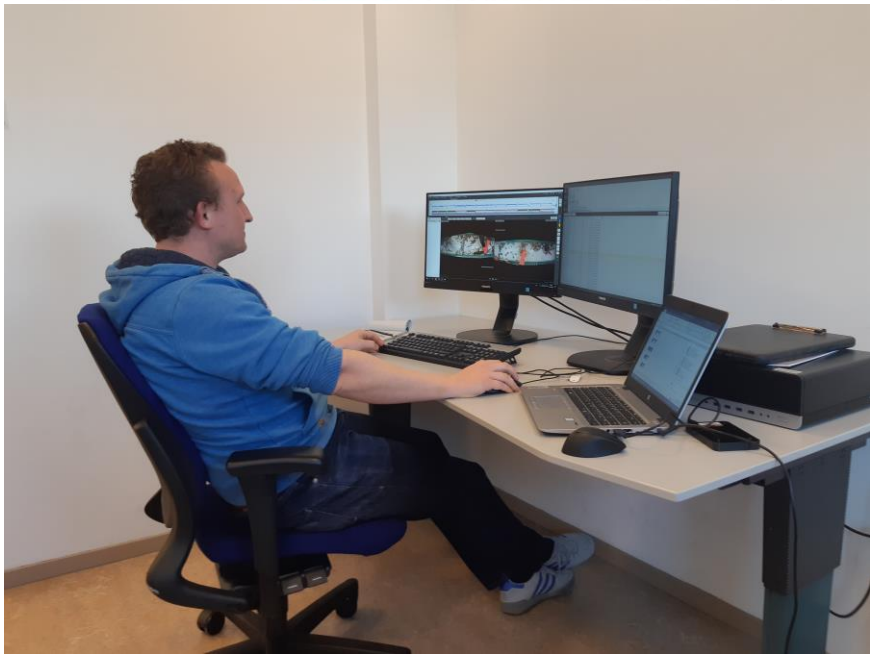
Electronic Monitoring – not quite there yet...

1. **Video review is labour intensive**
2. **Deal with large amount of (video)data**
3. **Level of intrusion / privacy**





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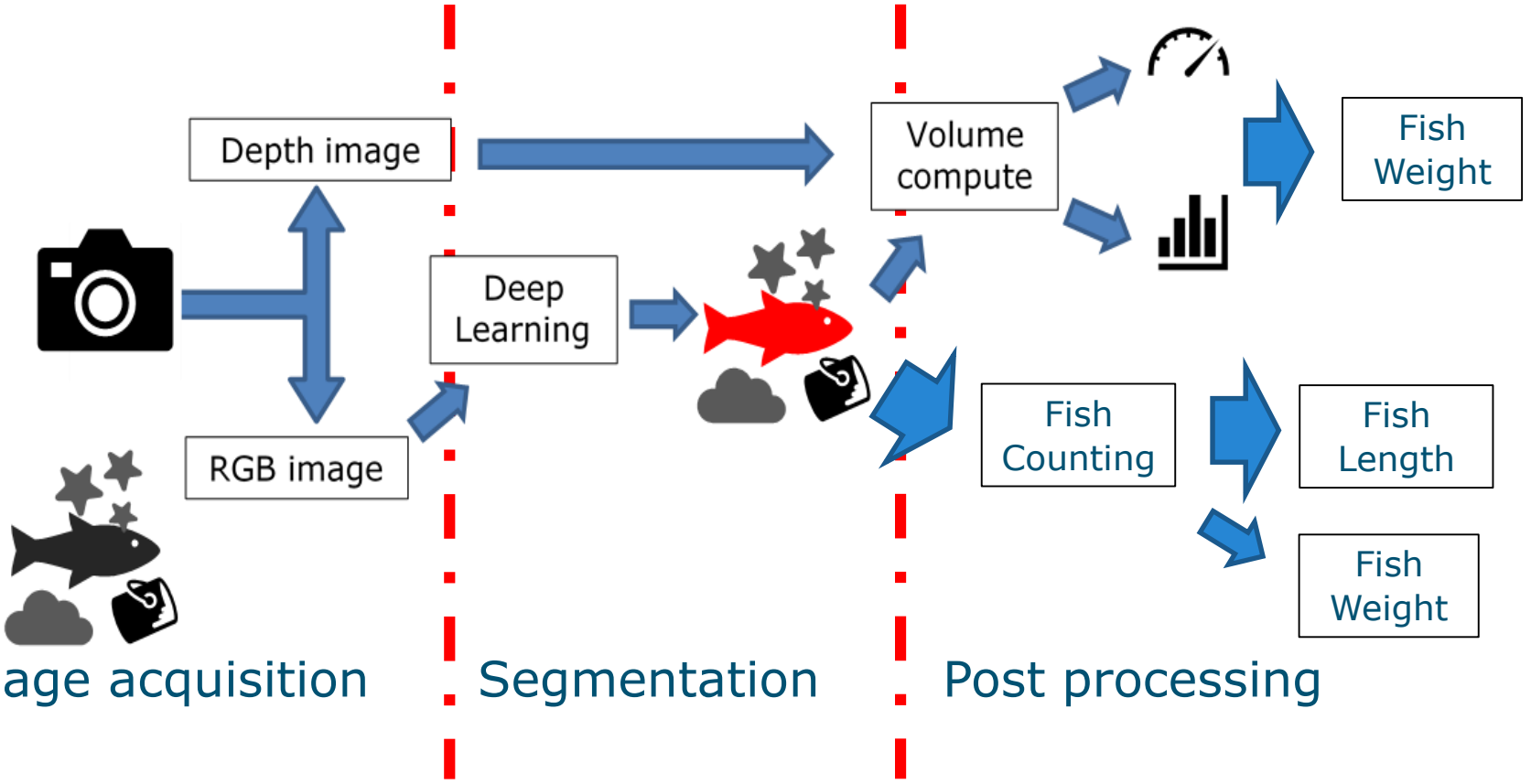
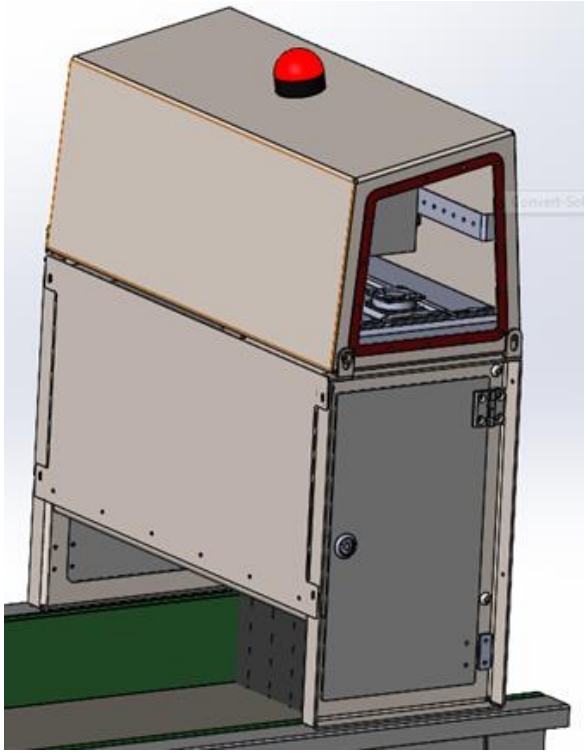
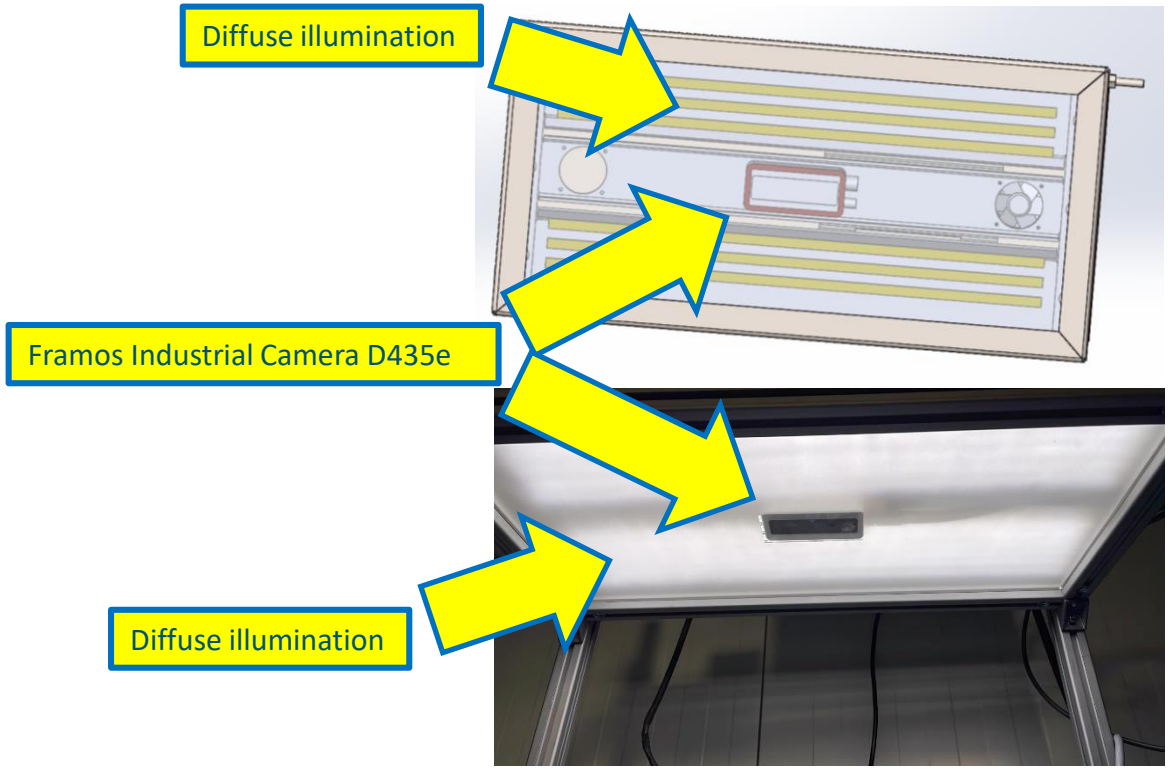
Automated catch registration by species and weight (almost) real-time through computer vision technology



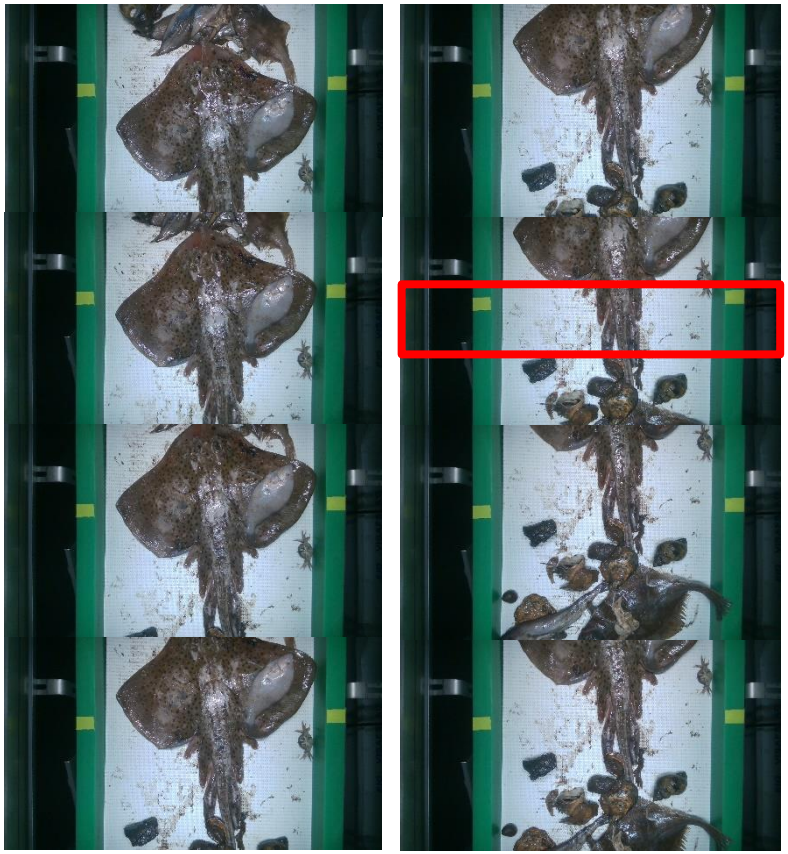
Fully Documented Fisheries – prototype 2.0



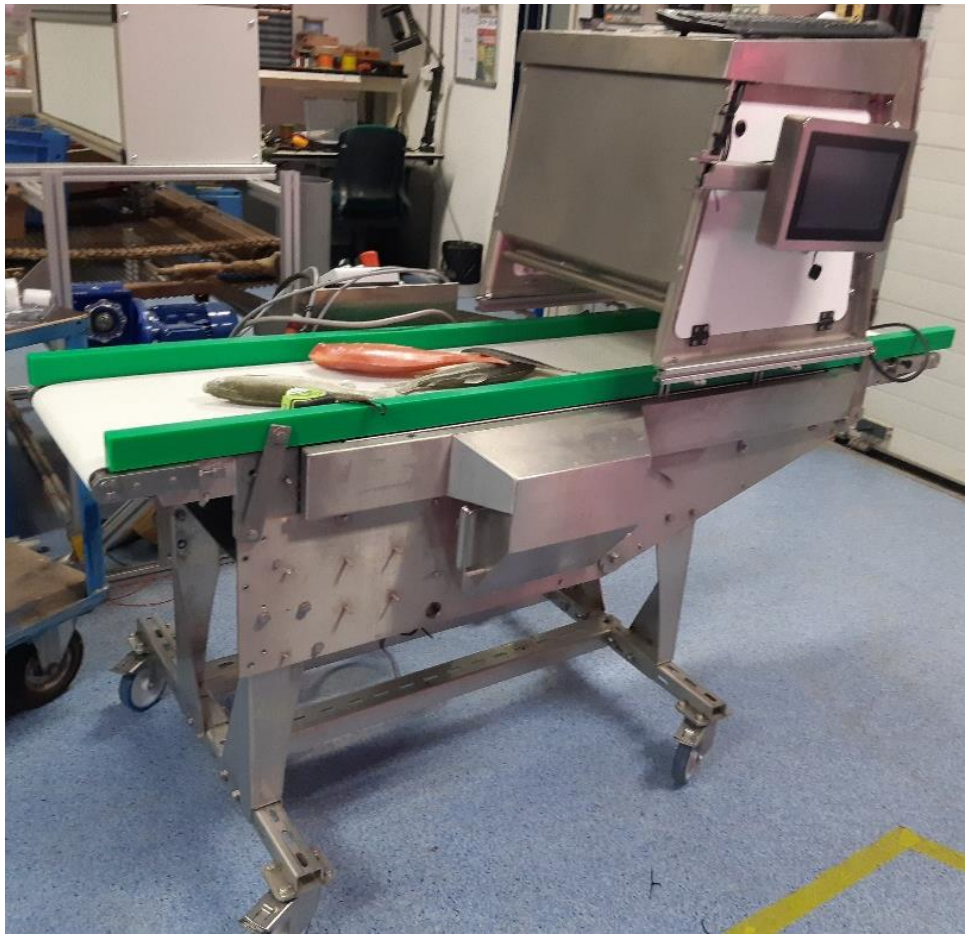


30 cm

Image overlapping: Matrix Image -> Line Scan



First setup: Lab and fish action



Ongoing innovation – preliminary results first project phase

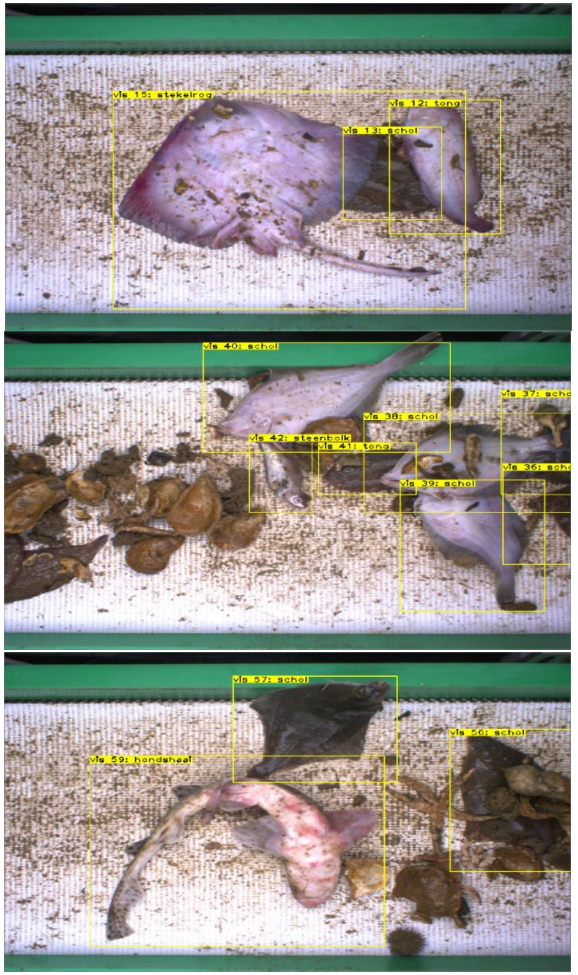
Classification with YOLOv3

Object tracking

First (published) results

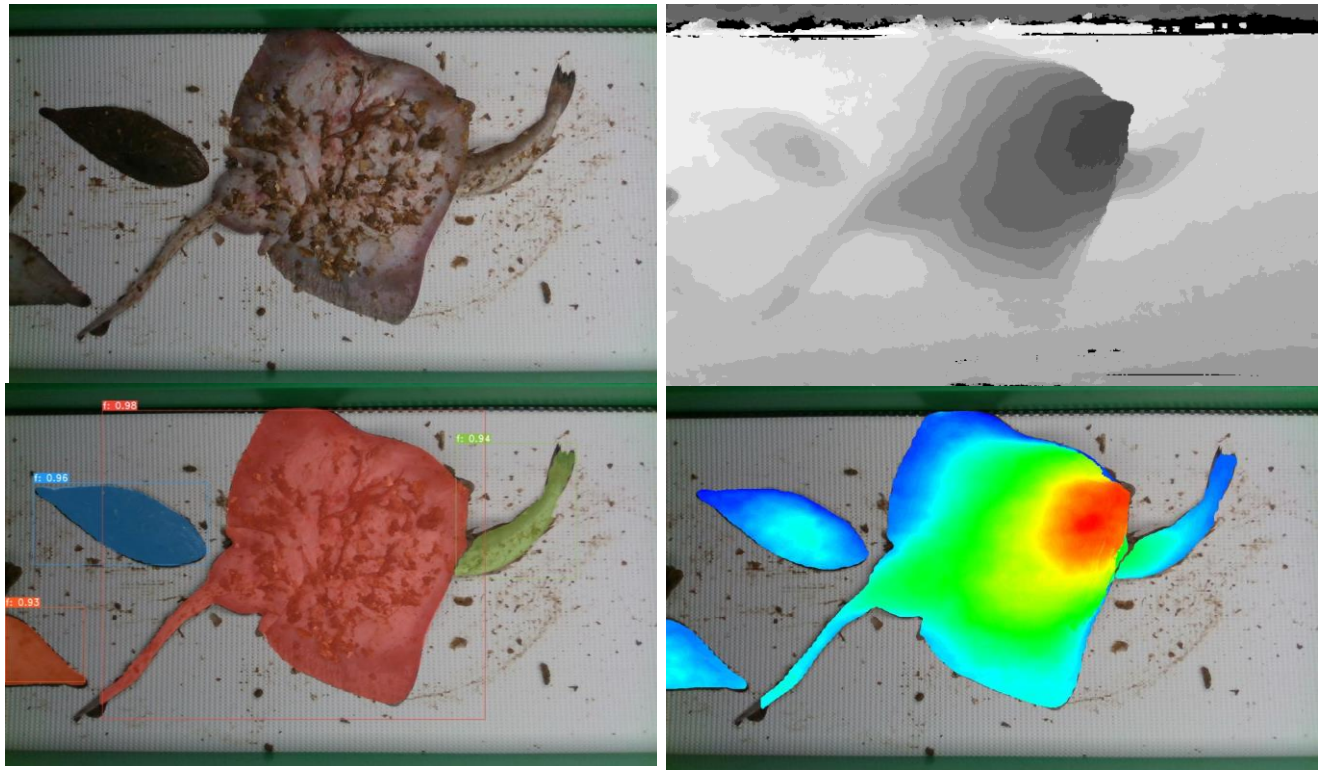
Van Essen et al. 2021 “Automatic discard registration in cluttered environments using deep learning and object tracking: class imbalance, occlusion, and a comparison to human review”. ICES Journal of Marine Science

- Recognizes 80% of fish with a 'count’ error of 20%
- Better score dorsal side compared to ventral side
- Occlusion, debris and location of the fish



In progress: Classification and Weight registration

- Improve data acquisition
- Improve training
- Innovate use of different algorithms
- Integrate 3D

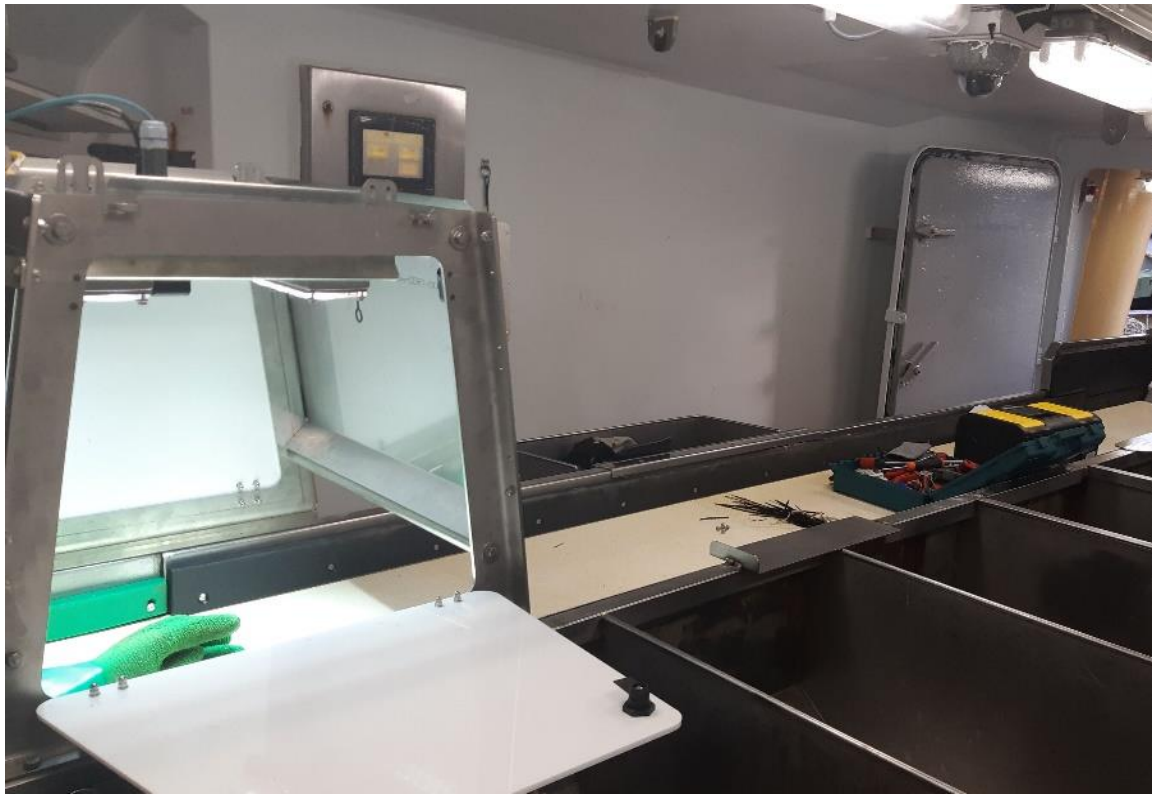


- YOLACT++ and volume computation

Trails at sea

Endurance test

Encounter challenges at-sea



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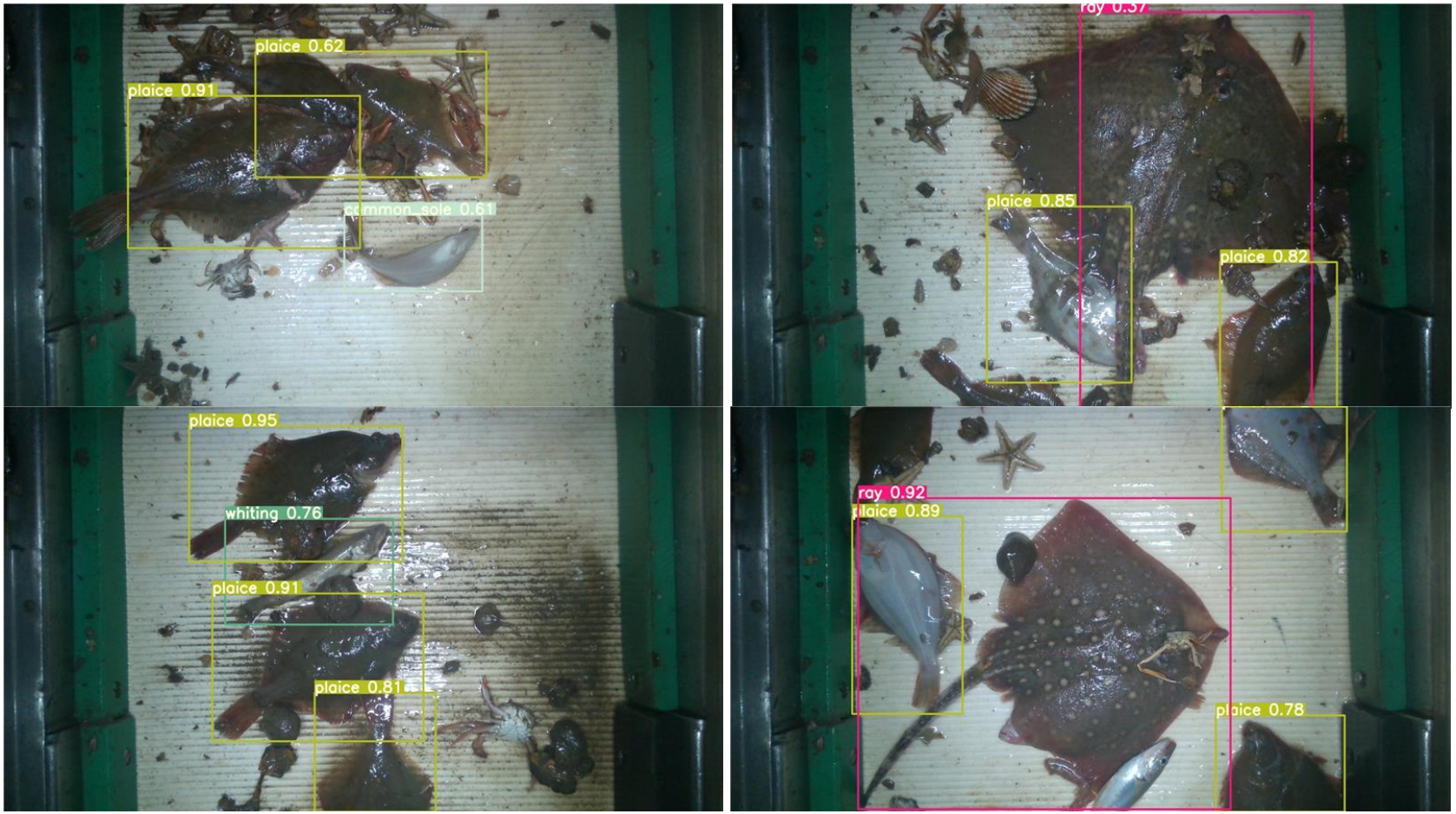
Trails at sea (preliminary results)



On-board preliminary results using YOLOv5

Fully Documented Fisheries - continued

- 3 more years

- Great cooperation (robotics and marine biology)
  - Generating more spin-offs:
    - Active learning
    - Robot fish sorting on board
    - Estimate catch quality / survivability

- International integration (e.g. EveryFish project)

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