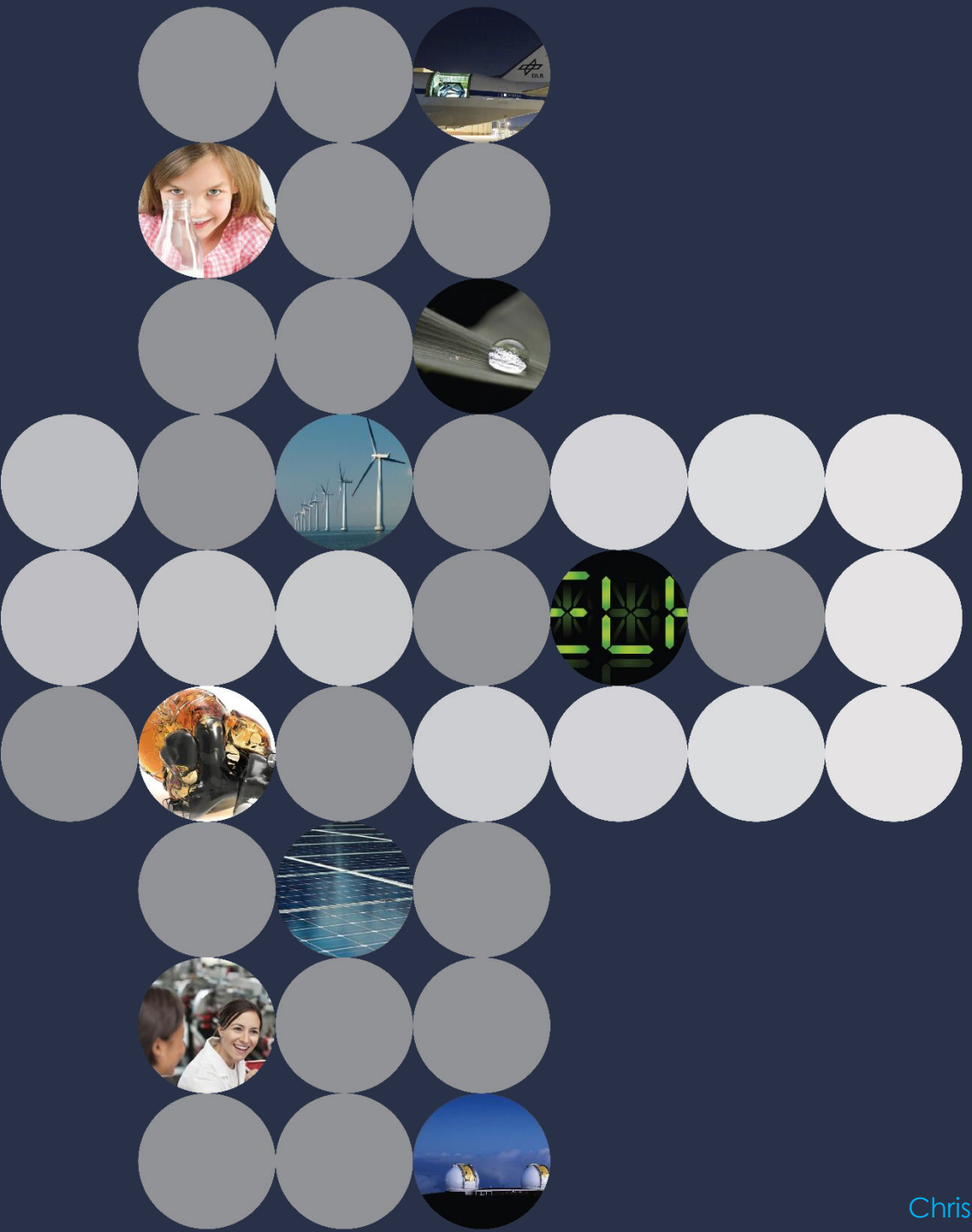
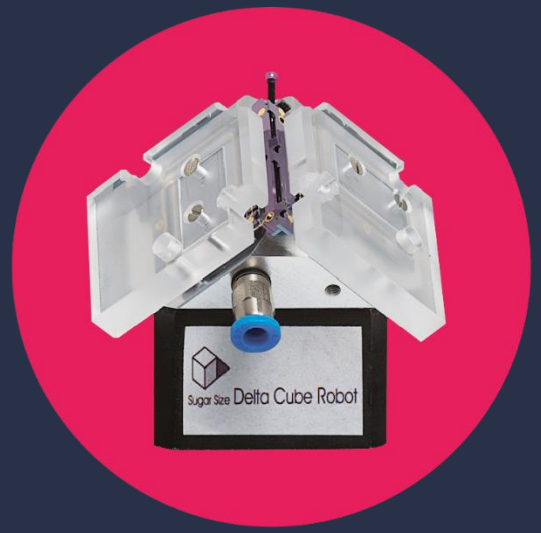


CSEM

technologies
that make ***the*** *difference*

Our **mission**



Development and transfer of world-class (micro-)technologies to the industrial sector in order to reinforce its competitive advantage.

- **Cooperation agreements with established companies**
- **Encouraging the creation of start-ups**

Expertise

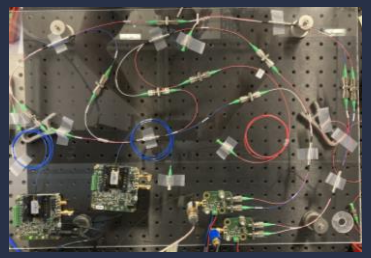
- System design & integration
- Miniaturisation

1. Flash imaging LiDAR

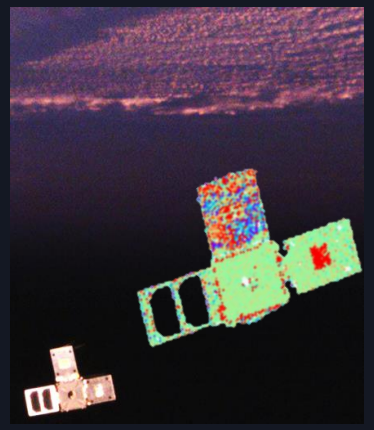
- Snapshot acquisition (< 20 ms)
- High spatial resolution
- Adaptive field-of-view

2. FMCW LiDAR

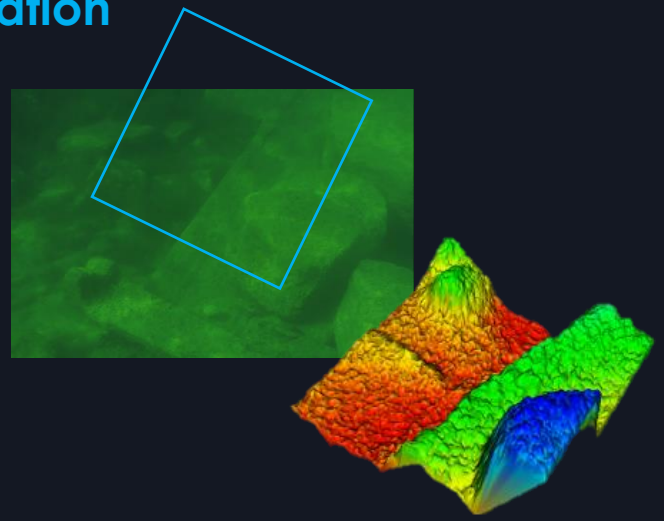
- Invisible
- Coherent
- High axial precision (< 50 µm)



Applications



- **Space: 3D pose estimation**
- **Bathymetry**
- All-weather navigation
- Geodesy
- Environment perception

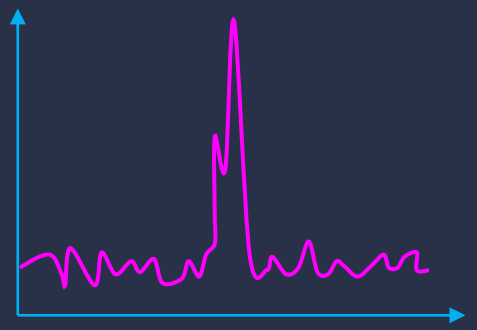


- Surface metrology – additive manufacturing
- Gas sensing

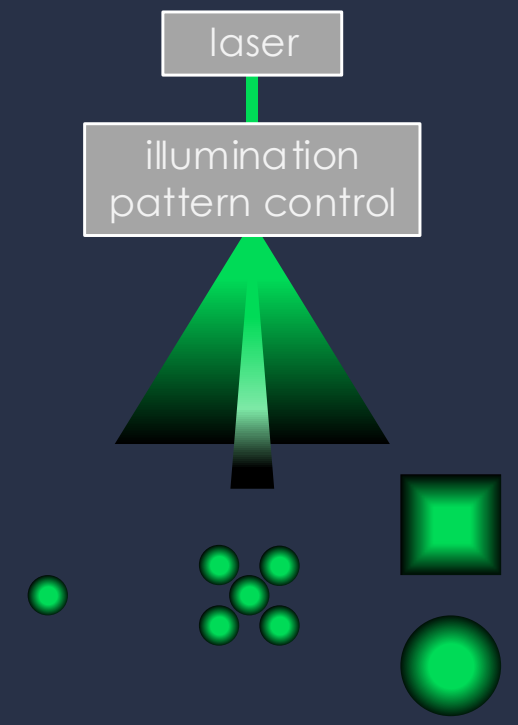
Hybrid flash imaging LiDAR

System design

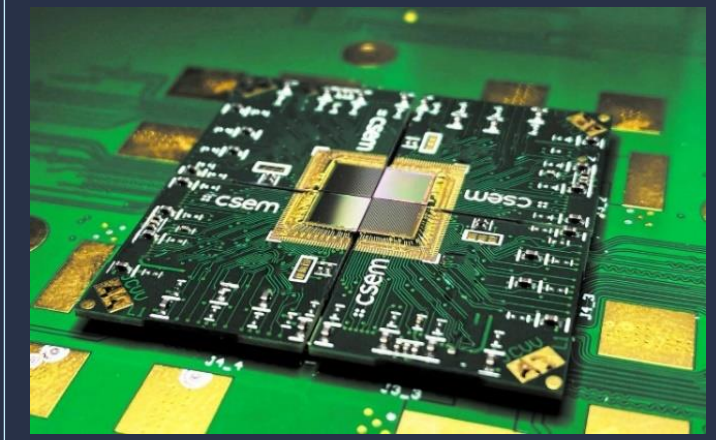
Time-gating & multiple echoes

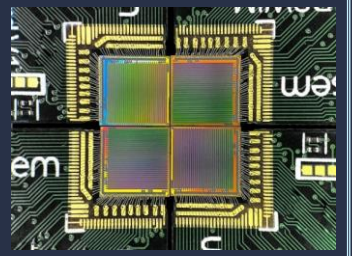


Illumination pattern control



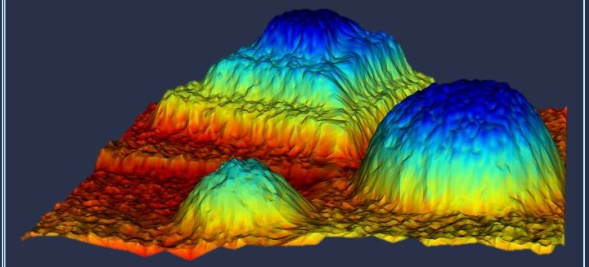
Focal plane: time-of-flight detectors





FONDAZIONE BRUNO KESSLER

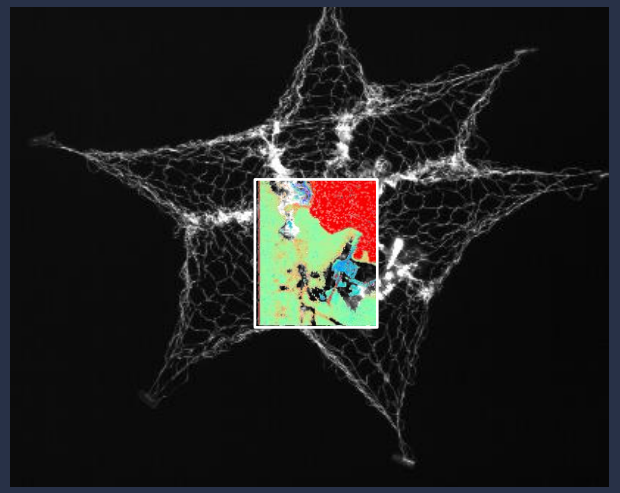
Embedded processing in system-on-chip

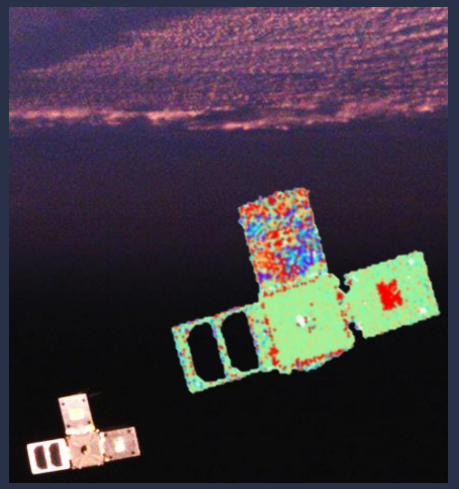


Space heritage – New Space

- Debris removal missions

- **RemoveDEBRIS**
  - Launch with SpaceX in April 2018
  - NET and VBN in-orbit experiments
  - Mission end April 2019





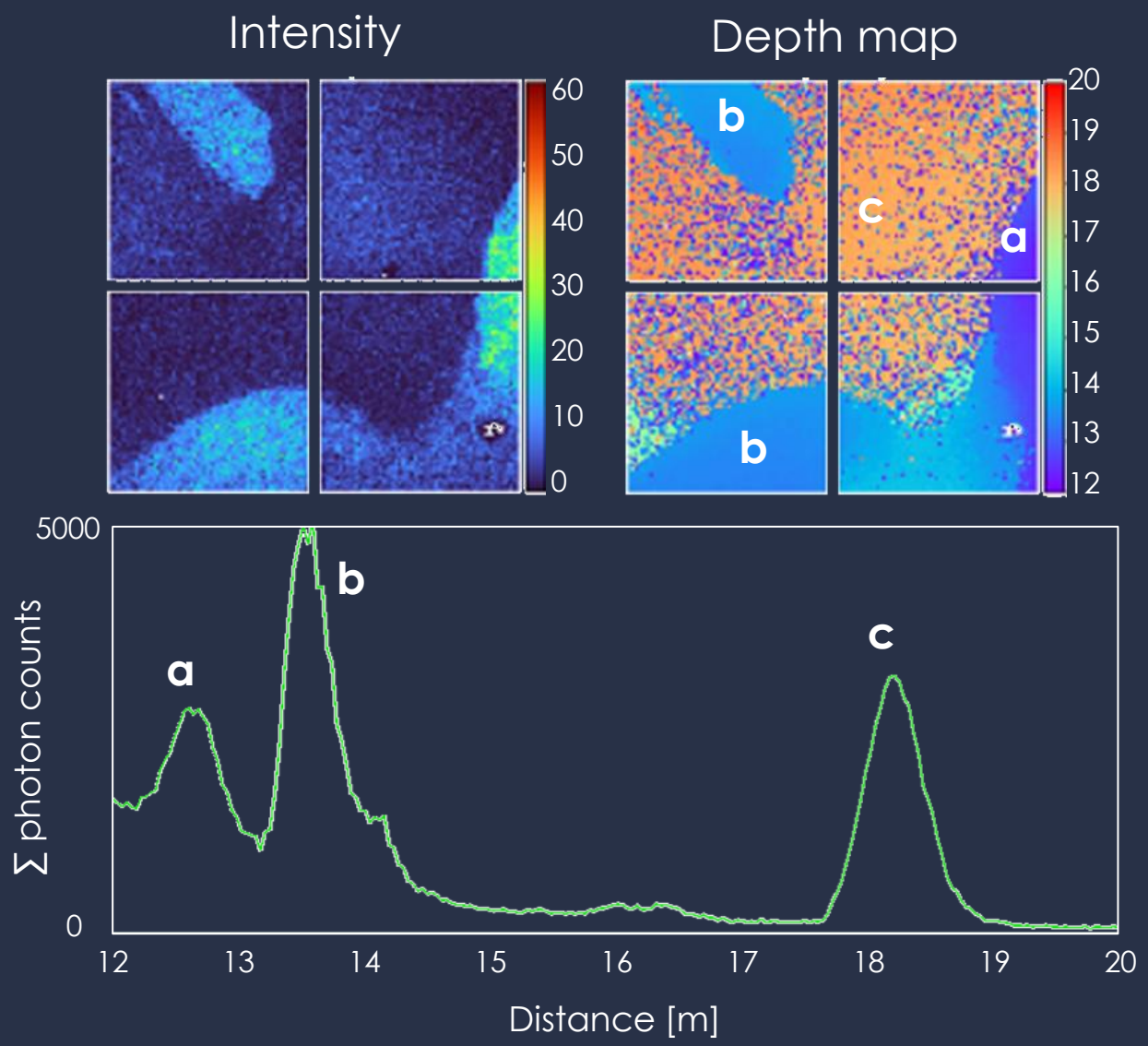
- **ADRIOS**
  - Launch: 2025
  - **Further miniaturisation**
  - **Embedded processing**, i.e. system-on-chip

Confirmed potential for **future commercialisation** (in-orbit maneuvers)

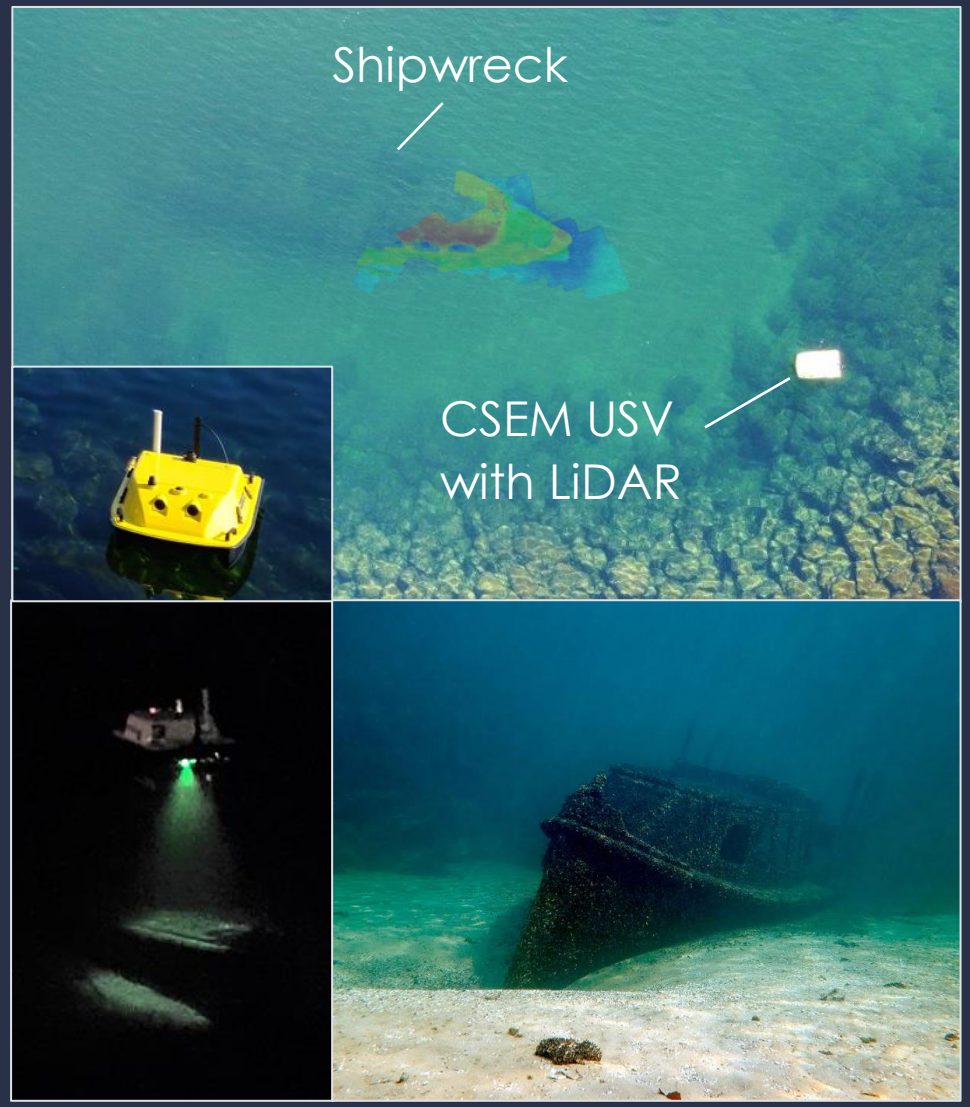
UNDERWATER 3D IMAGING

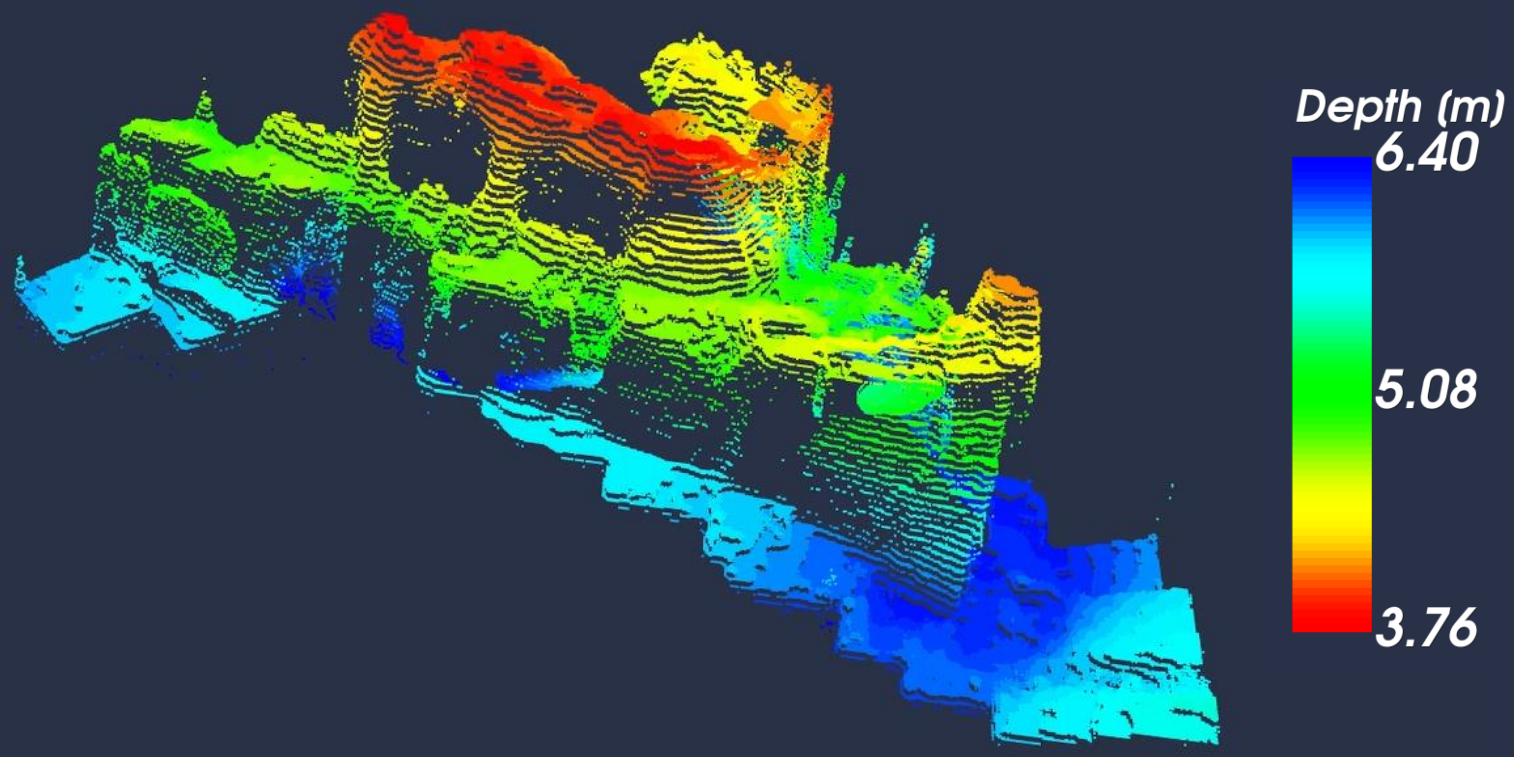
Multi-platform flash LiDAR

Airbone underwater imaging



Demonstration from unmanned surface vehicle (USV)





csem

Next steps & possible partnerships

- Embedded processing
- Diversification of applications
  - E.g. through-obscurants navigation
  - Manufacturing
- Industrialisation