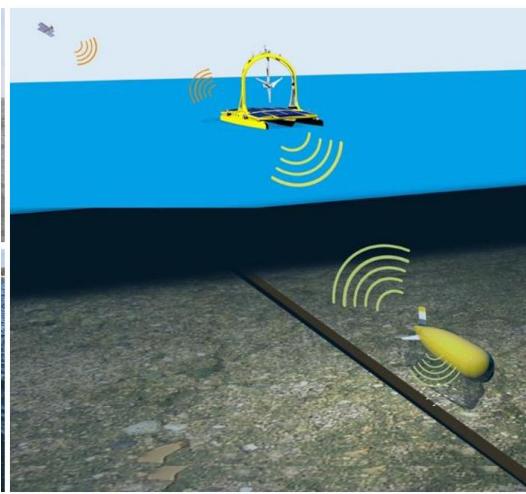


Remote monitoring for decommissioning using marine autonomous systems (MAS)

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Two main areas of opportunity for marine innovative monitoring approaches



Subsea – inspection, maintenance and repair

- Inspection is the short term target (<3yrs)
- Monitoring is a large proportion of the task- analytics are important
- Monitoring what?

Environmental & regulatory

- Increasing legislation, globally
- Decommissioning- biodiversity (eDNA), ‘evidence of absence’?
- Analytics- Enhanced understanding of environmental ‘baseline’
- MAS to introduce ‘persistence’ aspect
- Satellites and ‘full spectrum’ systems



Key issues for innovate monitoring approaches



- **Subsea (infrastructure) inspection**
 - A lot of activity SUBSEA = \$\$\$\$
 - Knowing what DATA is required – more precisely
 - Focus on the DATA AND ANALYTICS – not so much hardware and logistics.
- **(H,S and...) Environmental**
 - Business and safety cases
 - What will the future look like?
 - Data, data, data – transparency and timeliness to inform decision making for business, investment community and regulatory audiences.
 - Monitoring what – hydrocarbon, biological, metocean, physical condition?
 - Cultural change.
 - Safety for other users of the sea- e.g., fishermen

Decommissioning considerations

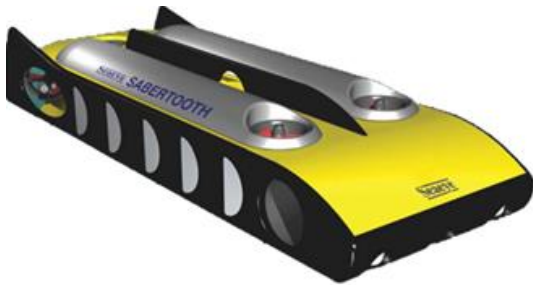


- Operators **ongoing obligations** to monitor the status of agreed 'barriers' in perpetuity for in-situ decommissioned installations.
- Balance between the **separate needs** of pre-decomm baseline vs. post-decomm data gathering
- **Water column vs. benthic** assessments?
- Includes horizontal (pipelines) and vertical structures (platforms)- **different tools** needed for the job
- The key importance of **regulator endorsed** technical, commercial and operational solutions.

The platforms...and sensors....



Large and high cost



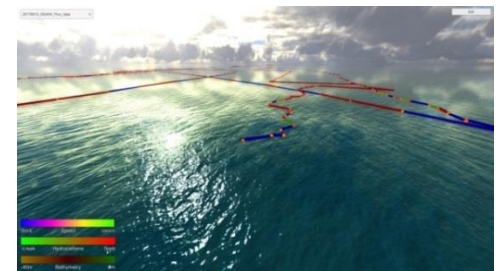
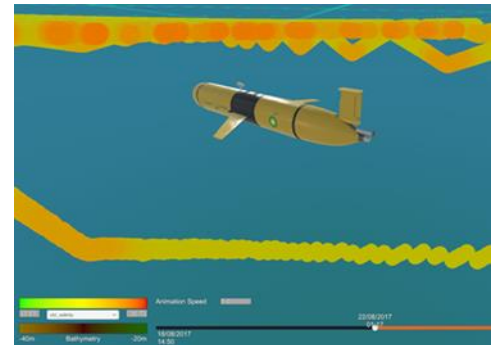
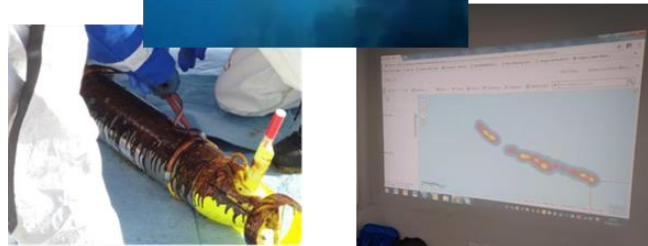
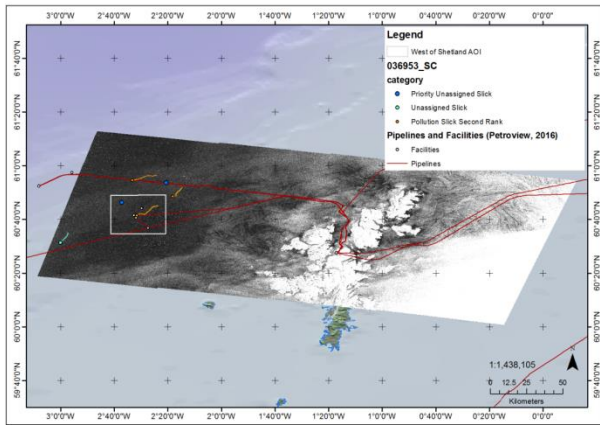
Small and low cost

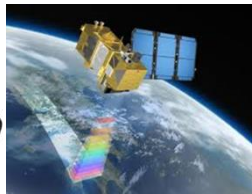
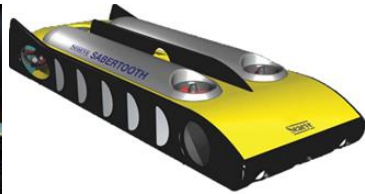


vs.
&



The platforms...and sensors....





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