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AUT 2019

# Building on the X-Prize: Collaborative Unmanned Survey Capabilities

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# Shell Ocean Discovery X-Prize

KM supported the winning Nippon Foundation-GEBCO Alumni team







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# Winning Technology

Collaborative USV and AUV System with Kongsberg at the core

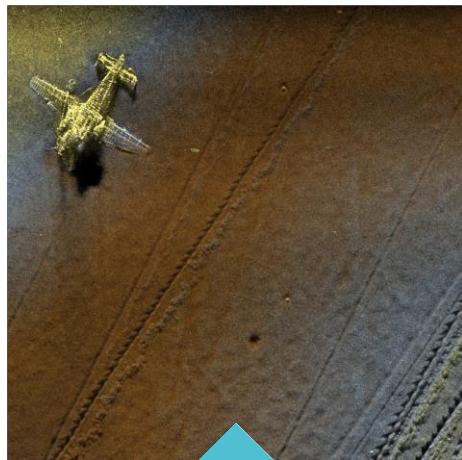


- SEA-KIT USV controlled by K-MATE autonomy engine
- Positioning provided by Seapath and HiPAP 502
- Deepwater multibeam EM304 on USV gondola
- HUGIN AUV with modified HISAS 1032 configured for long range bathymetry
- Communications via MBR and Mapping Cloud for data transfer

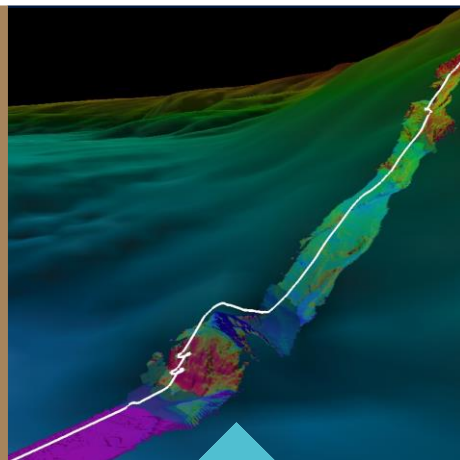


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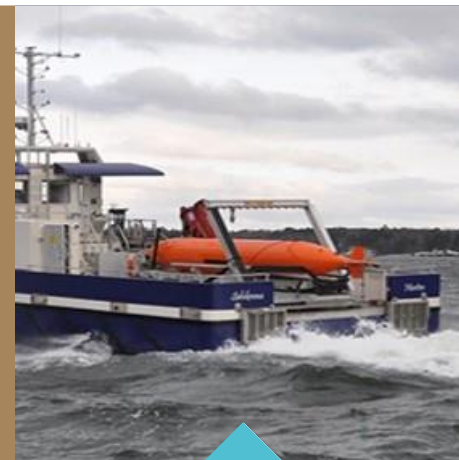
# Why Develop Collaborative Systems?



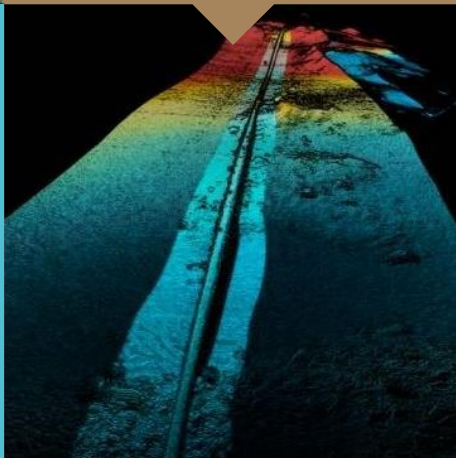
Better data quality



Enabling Concurrent Activity



Improved area Coverage



Better positioning



Reduced cost per bit of data





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# Challenges

**Weather**



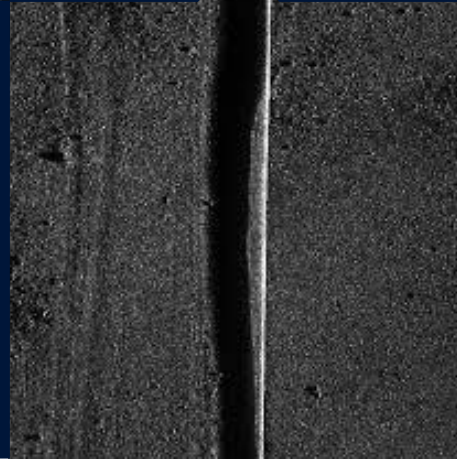
**Data Handling**



**Trust**



**Endurance**

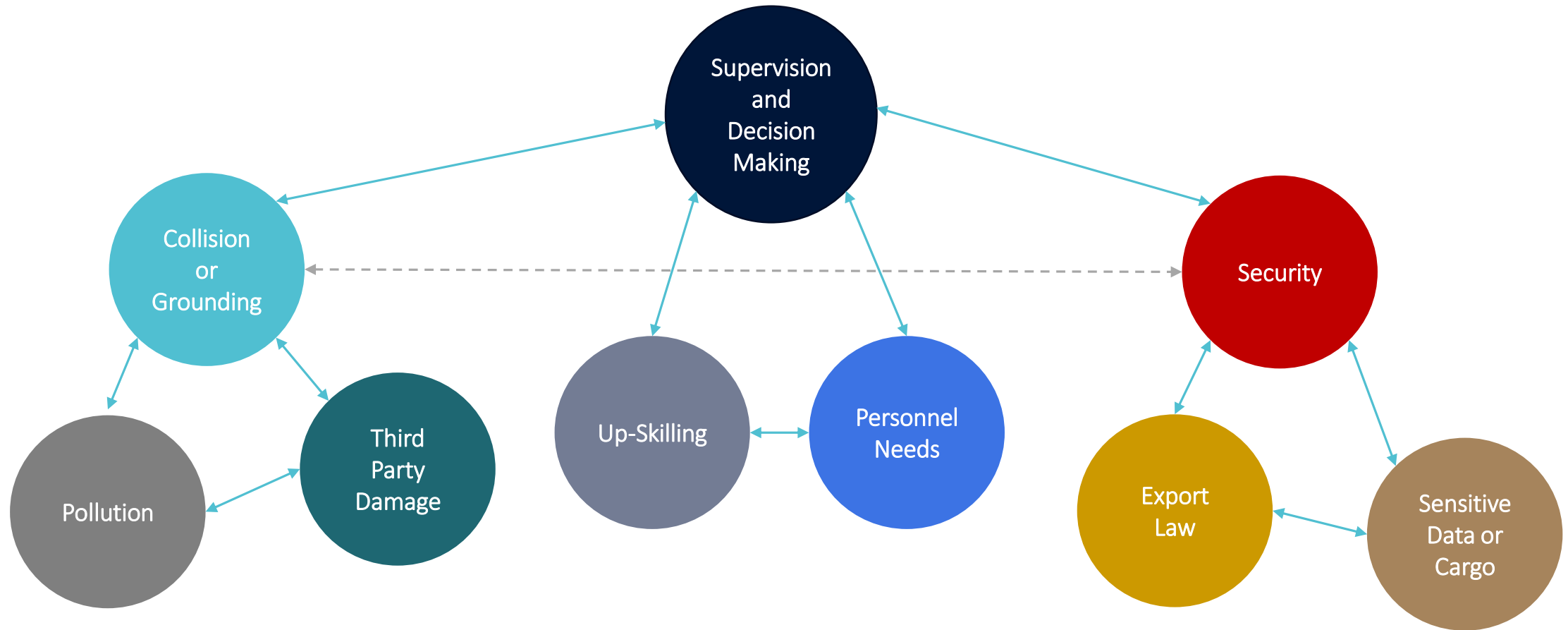


**Fault Management**



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# Challenging Considerations





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# SOUNDER

## USV SYSTEM



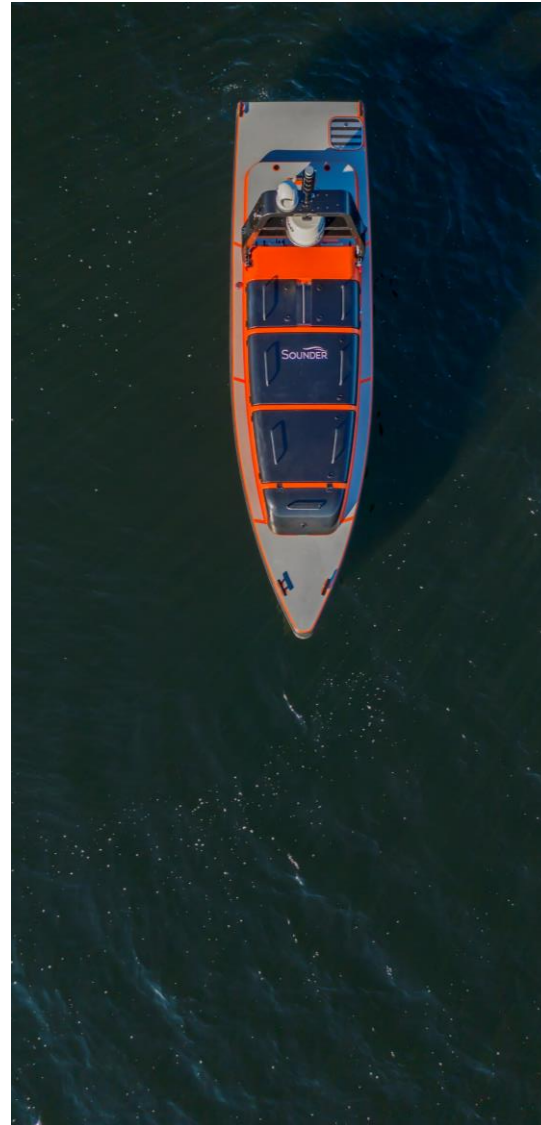




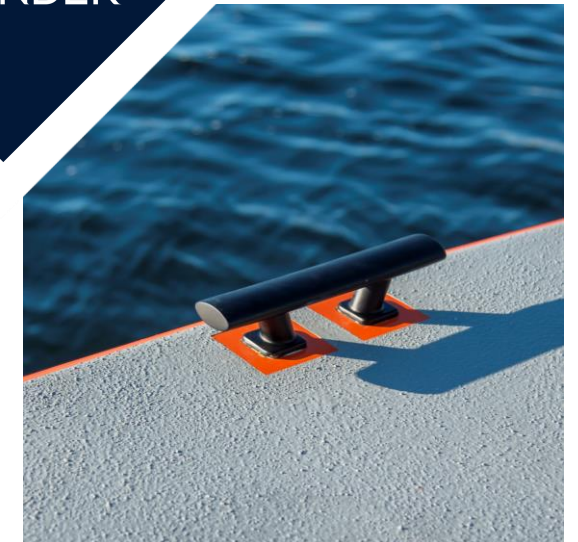
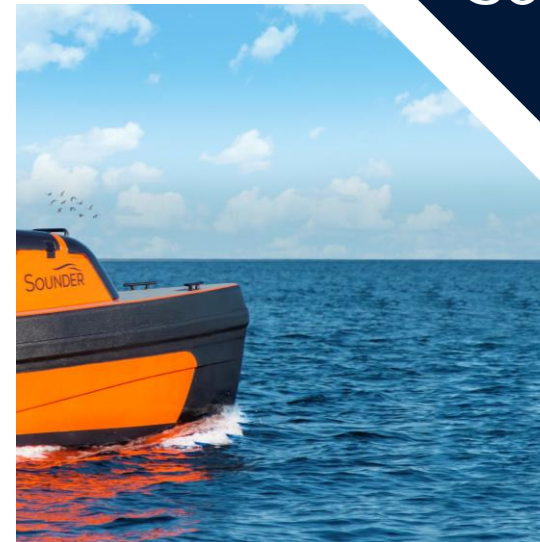
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# Unique

Multi purpose USV platform, optimal for hydro acoustic applications



SOUNDER





# SOUNDER

Three mechanically linked rudders provide exceptional maneuverability, while the stabilizing fins limit roll and improve directional stability which is important for data quality.



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## Situational Awareness and Collision Avoidance

The Sounder USV System features a state of the art scene analysis system for situational awareness that enables collision avoidance.





## Advanced Autonomy

Goal-based mission planning coupled with in-mission adaptive control means K-MATE and Sounder have true autonomy



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SOUNDER





SWIRE SEABED

Reaching further

# Swire Seabed successfully completes **second offshore pipeline** campaign with Equinor.

PRESS RELEASE





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# Unmanned Pipeline Survey

Summer 2019



- KM recently supported Swire Seabed to complete an unmanned pipeline survey
- We used a standard HUGIN AUV equipped with HISAS, EM2040, camera, laser, SBP and more
- It was operated from and supervised by the SEAKIT USV
- SEAKIT was controlled by K-MATE, with communications via MBR
- AUV supervision conducted by USV mounted HiPAP 502
- Operations run from control centre in Bergen
- Single mission capability at present





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**Thank you**

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