

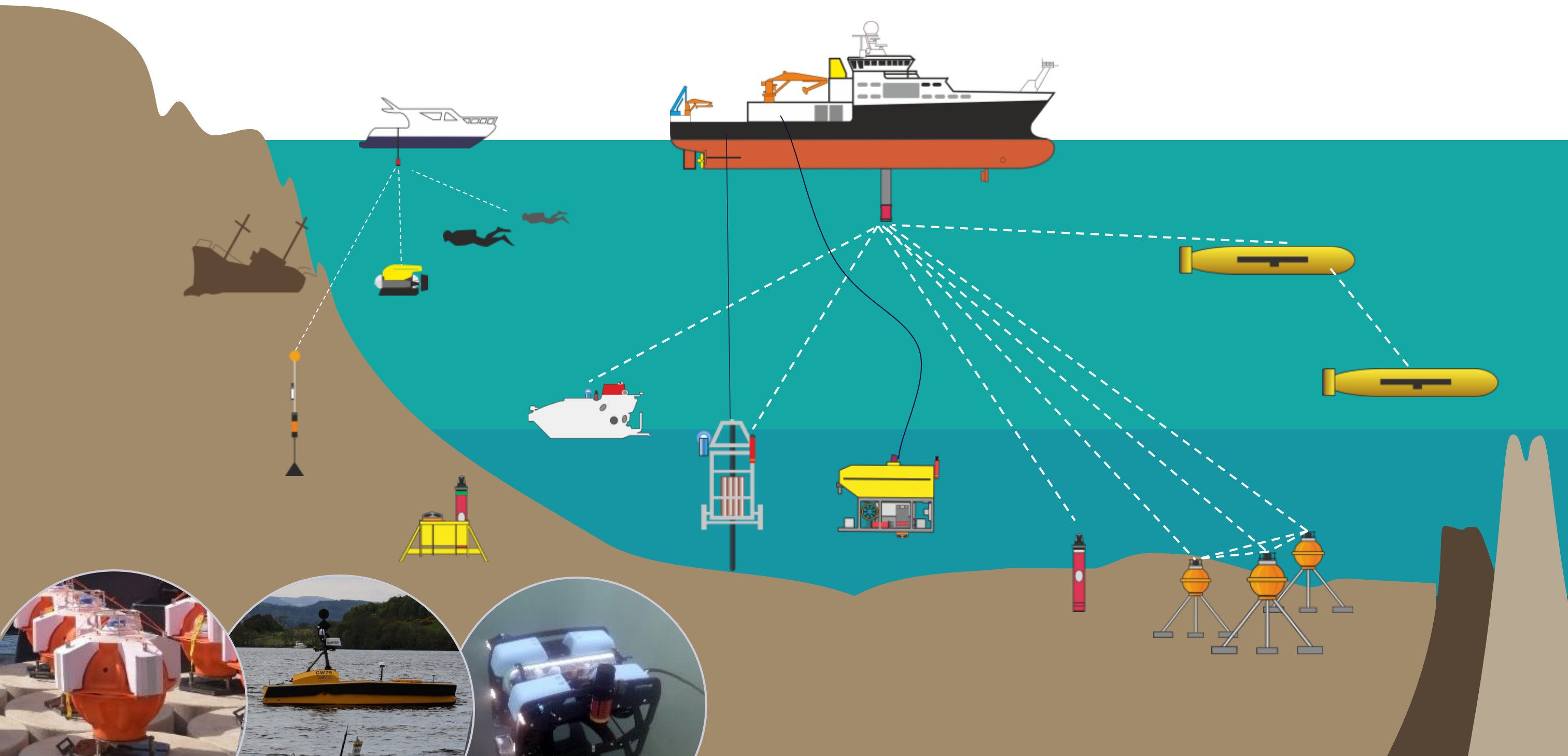


➤ USBL System Optimisation

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IRSO 2025 – Bergen – September 2025

➤ What is USBL?



➤ How does it work?

Transceiver face comprises two acoustic element types, which are recessed into high grade plastic and encapsulated in polyurethane:

- 1 x transmit
- A number of receivers



Transr

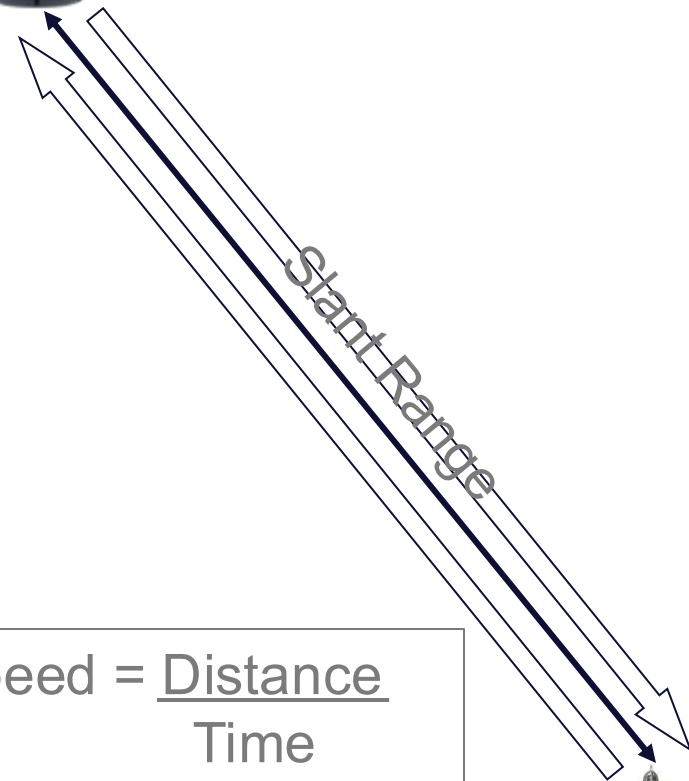
Receive Elements

➤ How does it work?

SLANT RANGE



2-way acoustic travel time and sound speed measurements used to calculate Slant Range



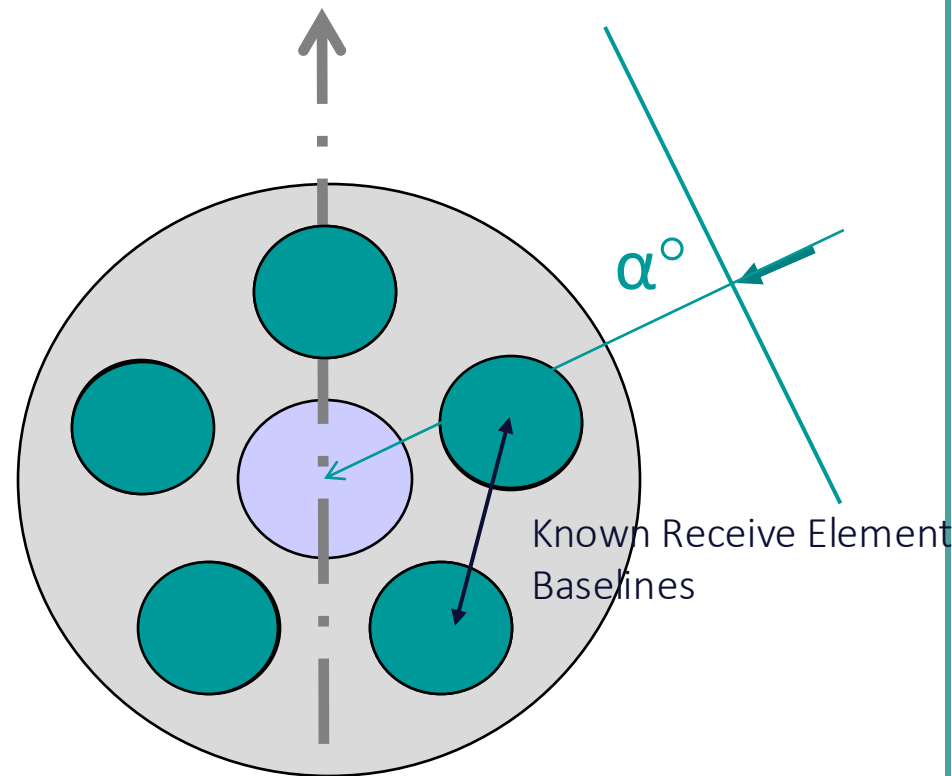
$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Time} \times \text{Speed}$$



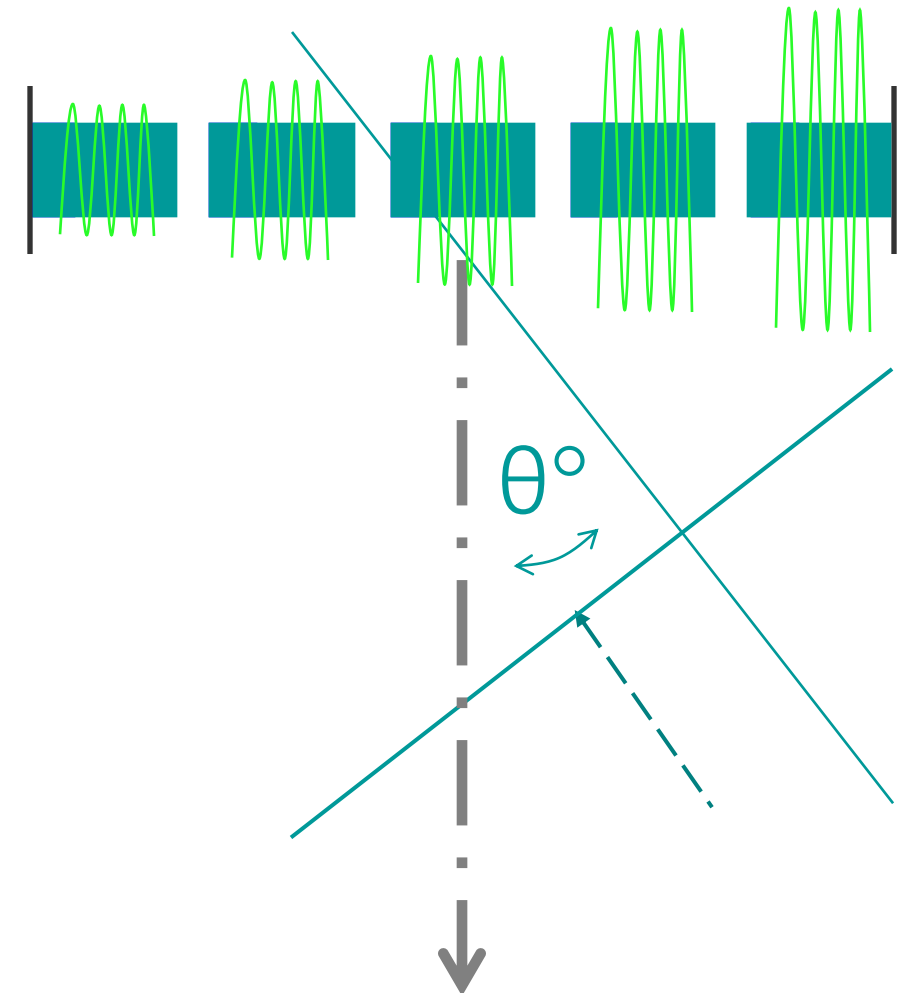
AZIMUTH

As the returning acoustic pulse passes over the transceiver, the time of arrival is measured for all elements.



The difference is used to calculate the angle from the forward mark (Ship's Head)

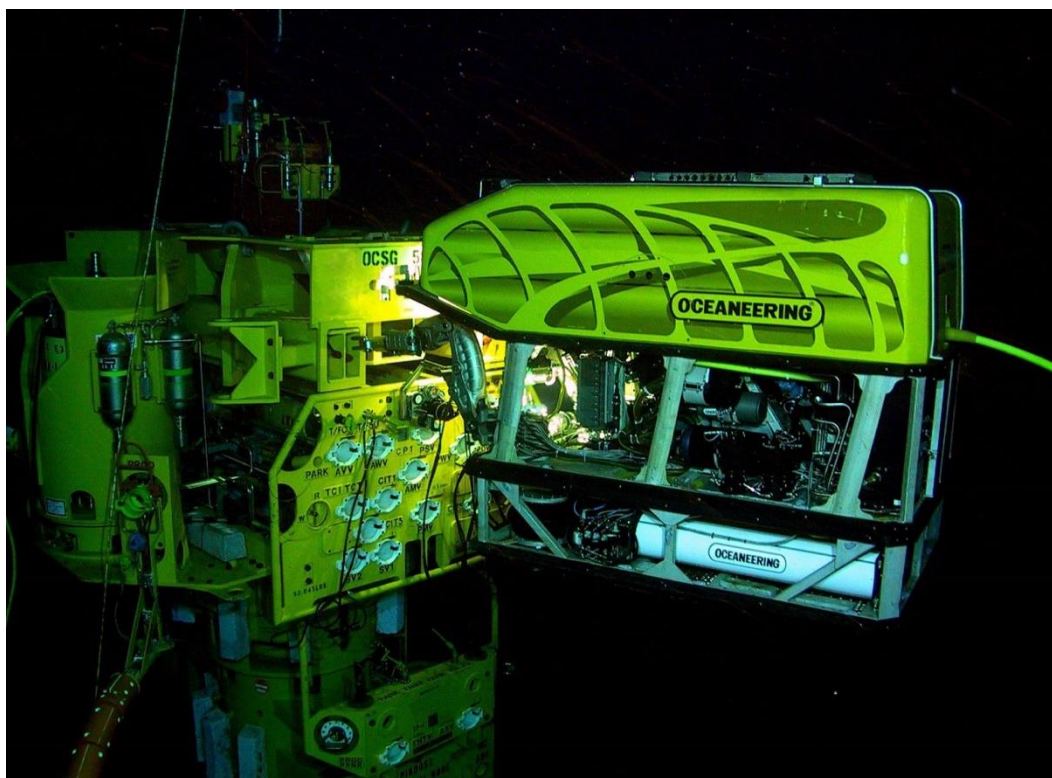
ELEVATION



Time of arrival (phase) and signal amplitude are analysed to calculate the elevation angular offset

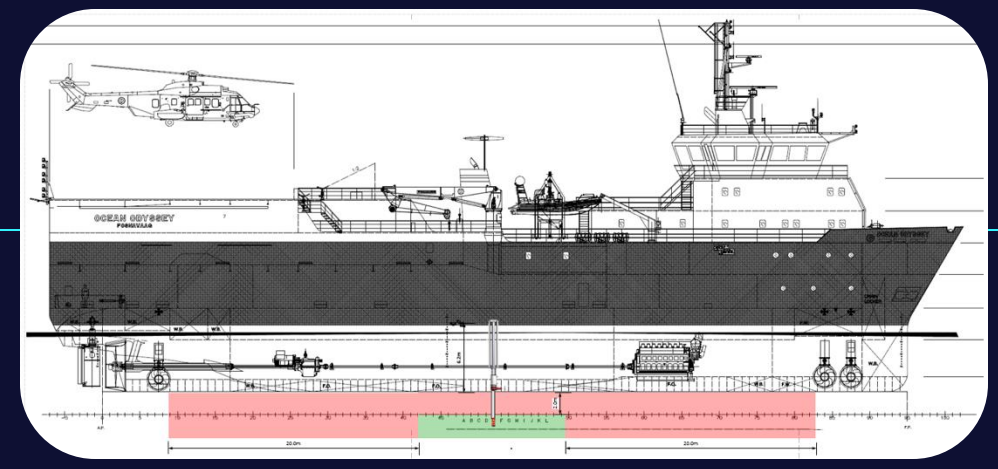
➤ **Part 1 – Considerations**

➤ Q1: What will the system be used for?



➤ Q2: How and where will the system be deployed?

- Reduce received noise
- Clear aerated water
- Repeatable position when deployed
- Vibration resistant



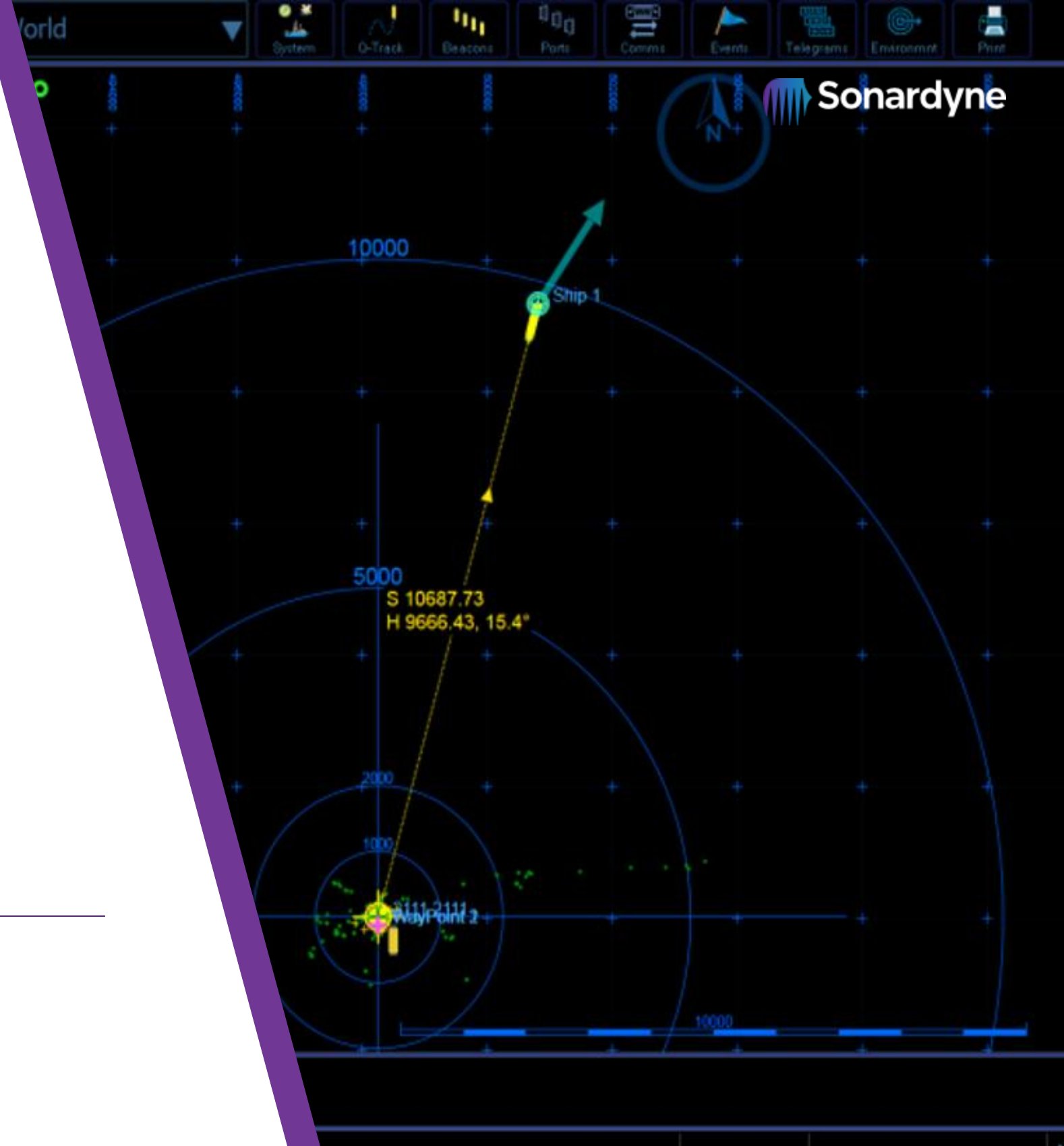
➤ Additional options

Long-range – determined by frequency

Inertial navigation – Improved precision, fast update rate, reduced acoustic traffic, improved battery life

Transponders – type, capability, depth rating

Acoustic release / Modem

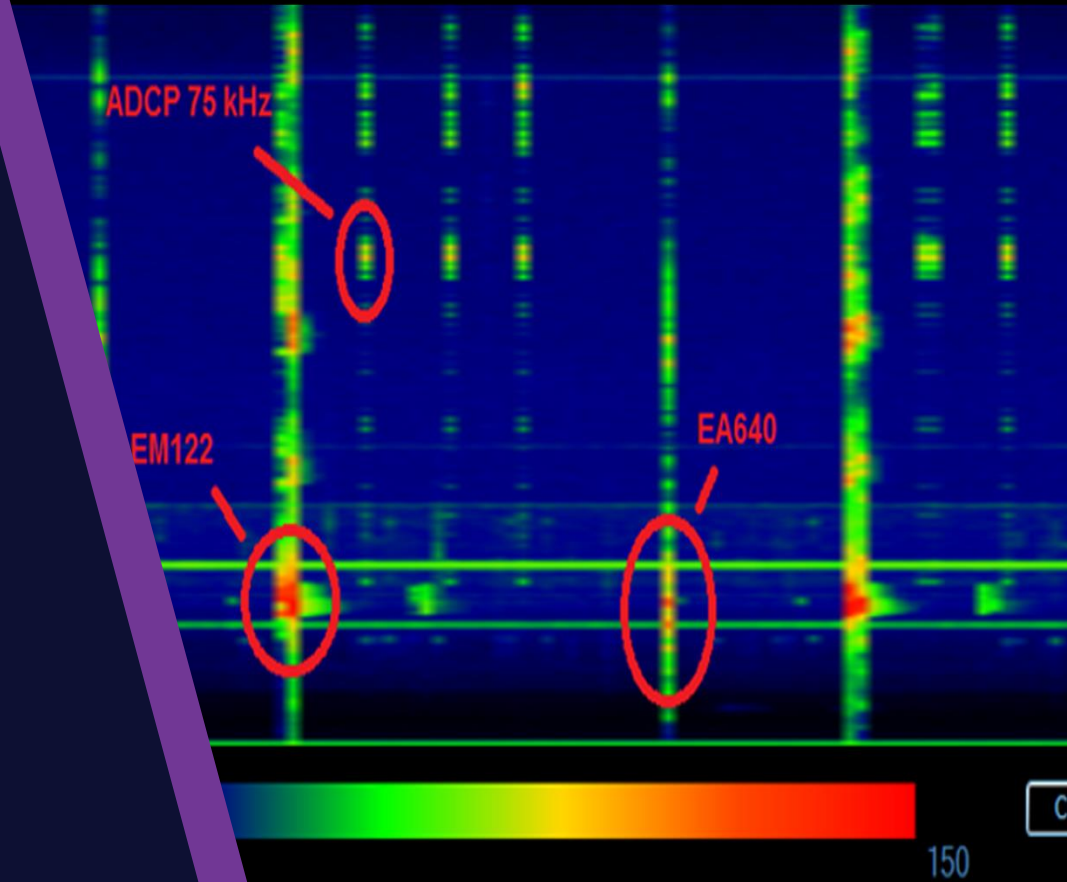
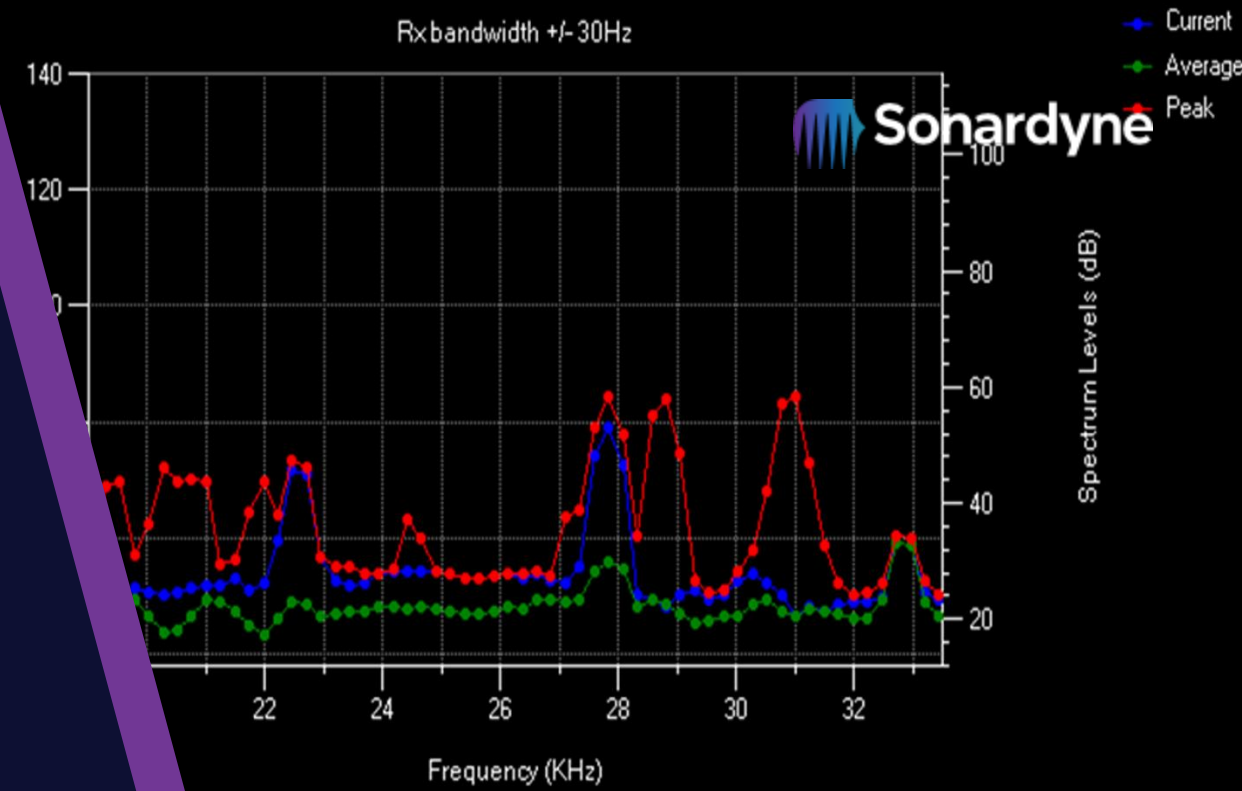


Part 2 – System Optimisation

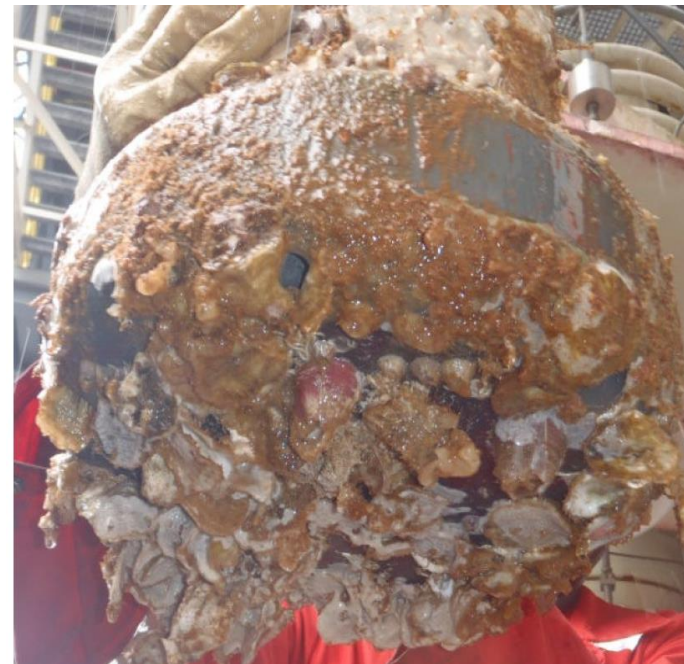
➤ Noise

Frequency management

Monitor for noise sources that impact USBL



➤ Maintenance



➤ Competency



Part 3 – Fine tuning

➤ Signal diagnostics – surface

Improve system performance

Monitor in real time signal quality



➤ Signal diagnostics – subsea

Use acoustic comms link to measure subsea environment

Remotely change settings to improve performance

Monitor for changes



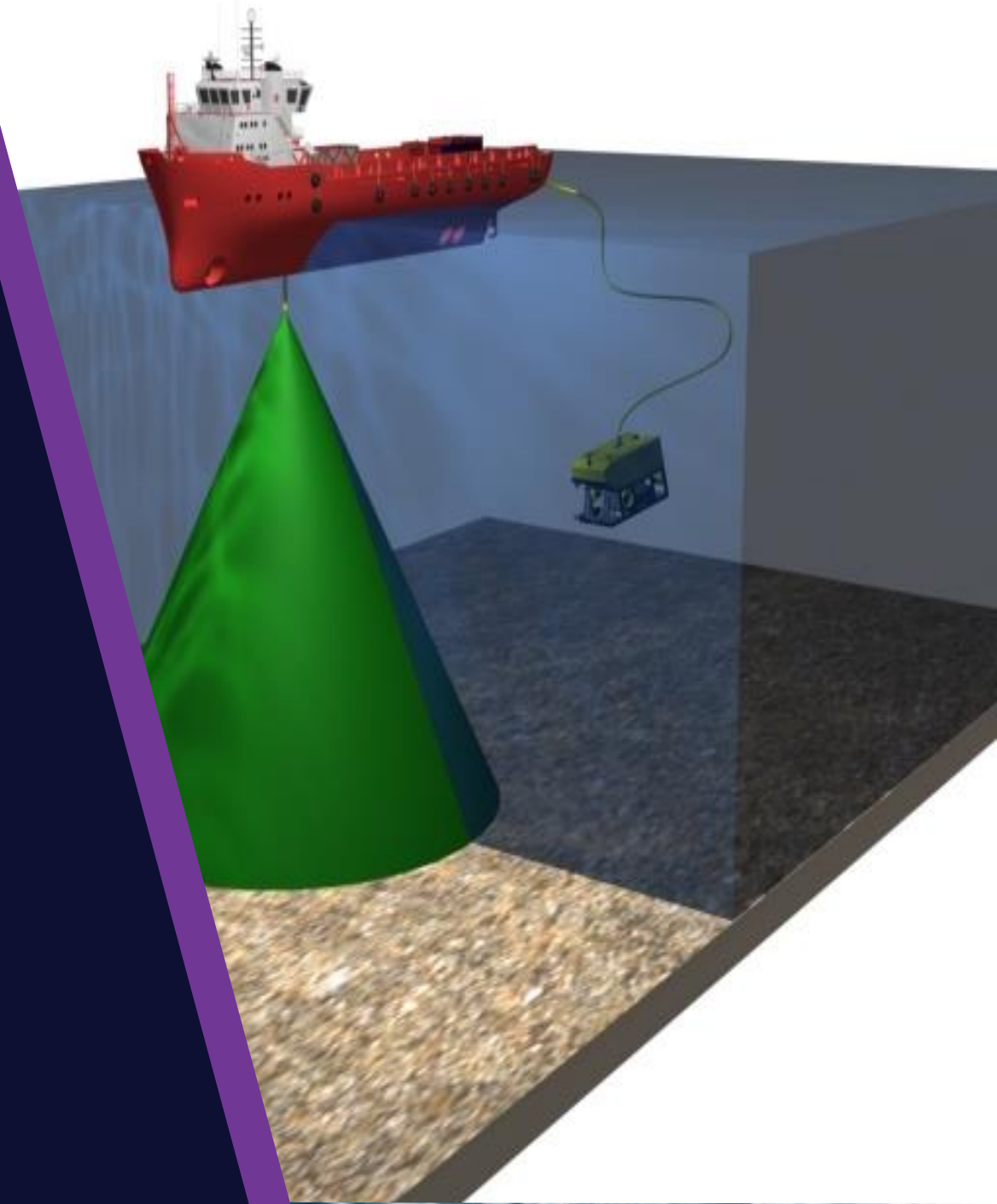
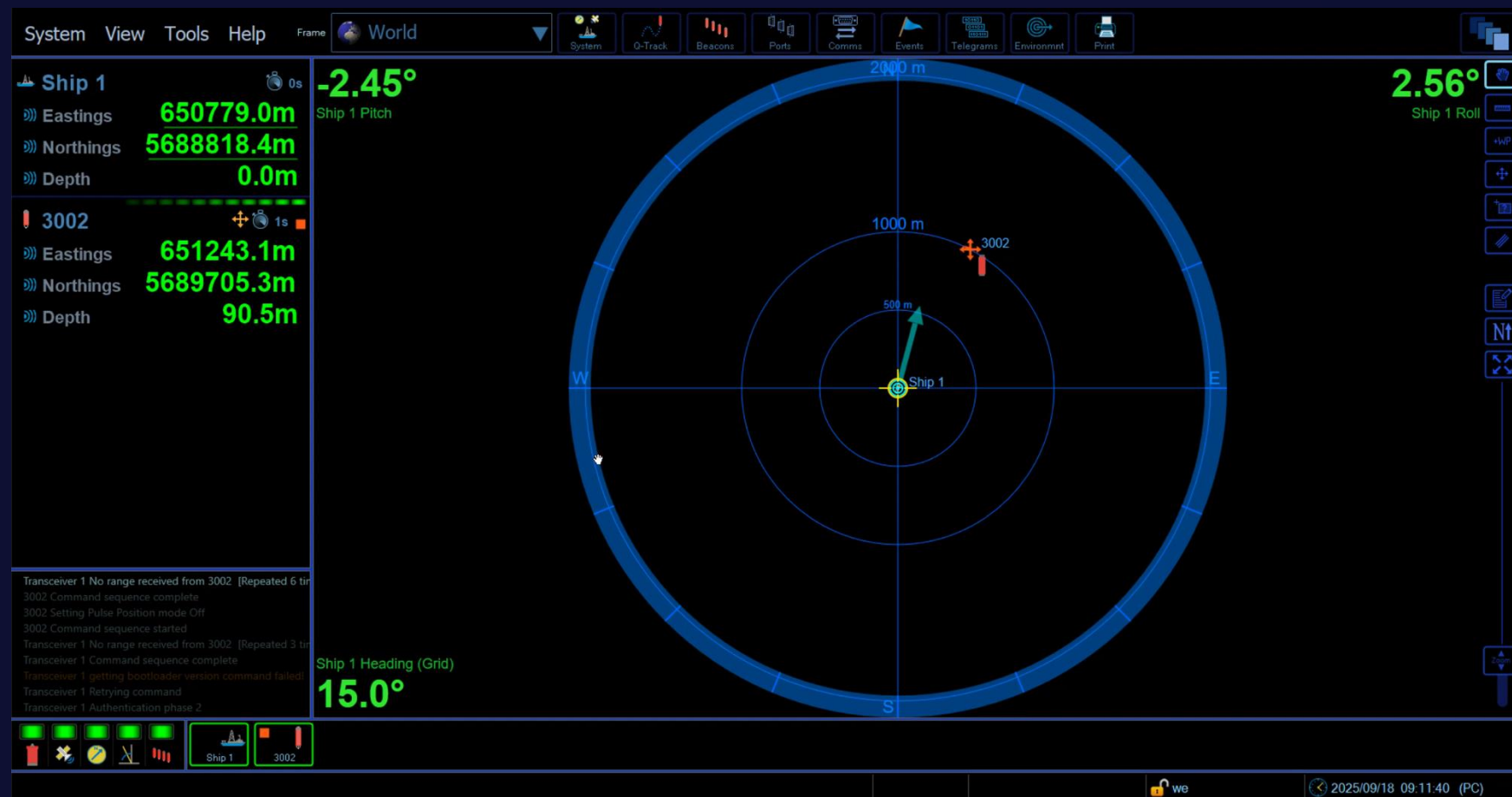
Sonardyne

➤ High-elevation tracking

Susceptible to interference from surface noise (waves, vessel etc)

Thermoclines have maximum impact at surface

Use beacon or 3rd party depth sensor

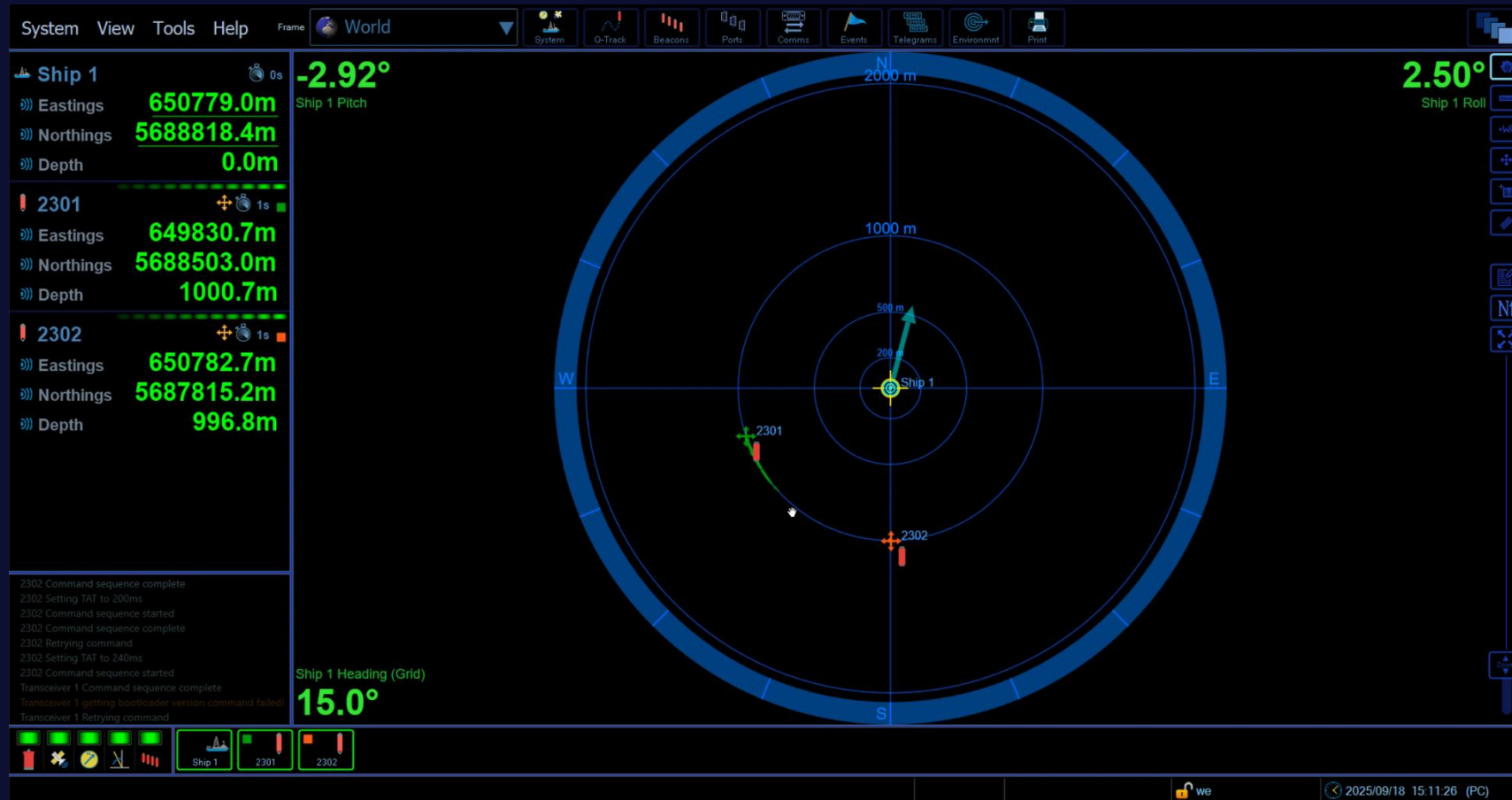


➤ Simultaneous operations

Cross-over of acoustic signals

Blocking of acoustic signals

Ability to run multiple systems side-by-side



➤ Conclusion

Use the right system for the job

Correct installation

Train and maintain

Fine tune using inbuilt system tools



> Thank You

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