

Anti-Submarine Warfare Towed Array Capability for Unmanned and Small Platforms

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SEA - who we are



Parent Company



Part of the Cohort Group plc

300+ employees



Four UK locations and offices in Canada, Malaysia and Australia

Capability Driven



Design, manufacture and support of Maritime Combat Systems, Traffic Enforcement and Subsea Control Systems

Technical Solutions



Proven research and advice history in Dismounted Soldier Systems and Maritime Combat Systems



Towed Array History



Large Diameter

Up to 600 m in length



Blue Water Navies

Traditionally used and towed from large vessels



Key Sensors

In the detection, tracking and classification of other vessels



Low Frequency

Alongside variable depth, beamforming and greater detection ranges



Large Handling System

Large vessel deck space required



Costly

To purchase and operate



KraitArray™ V1 - The First Generation



Specifications

50 m
Maximum
Length

Up to 32
Acoustic
Sensors

Up to 5
Non-Acoustic
Sensors

Digital
Customer
Interface

50 Hz to 32 kHz
Receive
Bandwidth

24 bit, 120 dB
Dynamic Range
Digitisation

Configurable
to Customer
Requirements

Low
Power

KraitArray™ V2 - The Next Generation



Specifications

Up to 150 m
Maximum Length,
Multi-Module

Up to 192
Acoustic
Sensors

Up to 24
Non-Acoustic
Sensors

Digital
Customer
Interface

5 Hz to 20 kHz
Receive
Bandwidth

24 bit, 120 dB
Dynamic Range
Digitisation

Configurable
to Customer
Requirements

Low
Power

KraitArray™ Development Challenges



Inter-Module Connector

Withstand axial tow forces
In-line with hose
High electrical pin density

Hydrophone

Low self noise
Small diameter
Low power

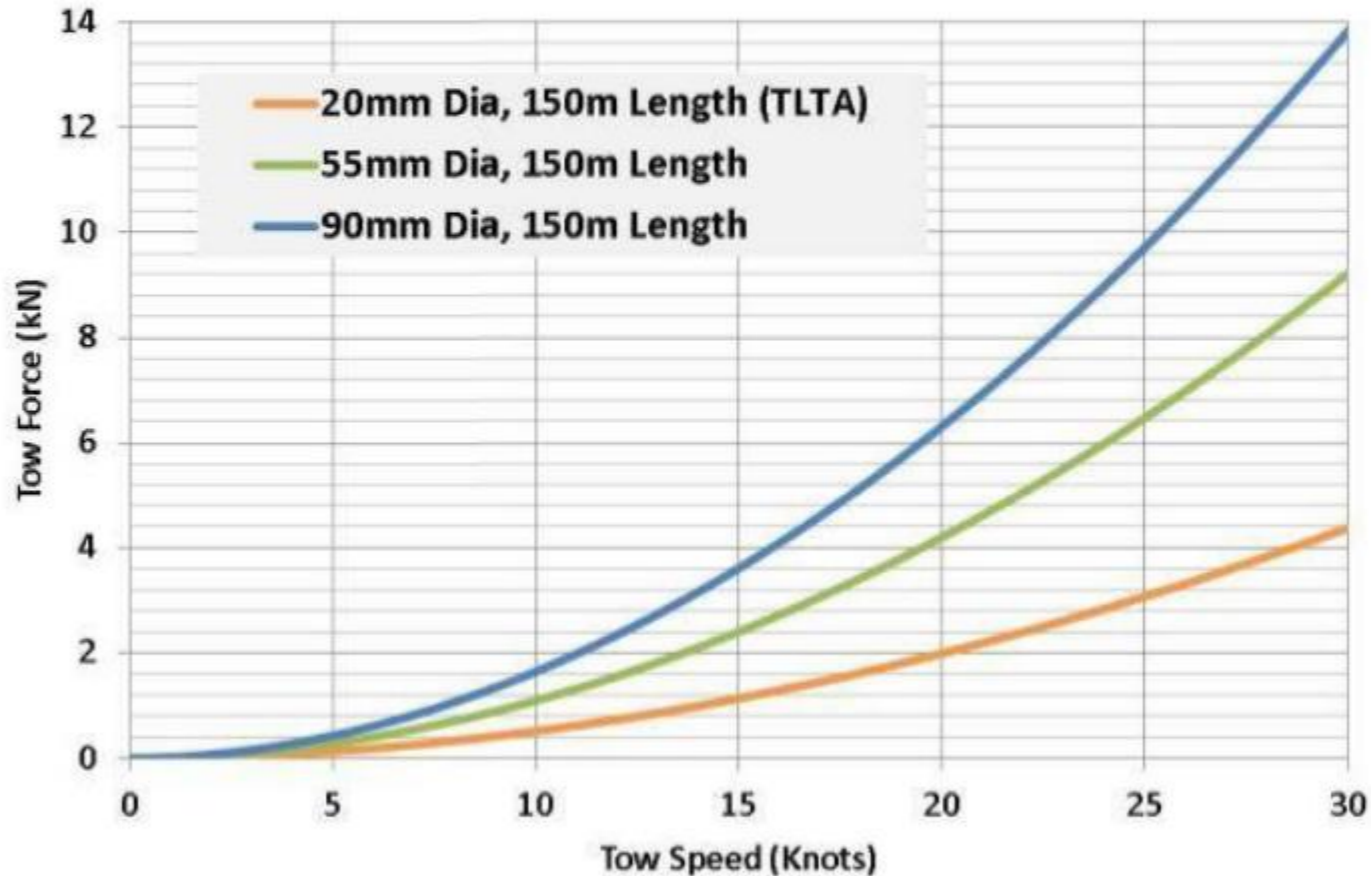
Strain Member

Mechanical backbone
Withstand hydrodynamic drag forces
High tensile strength, low elasticity

Digitisation System

High dynamic range
Low noise and power
Distributed through the array

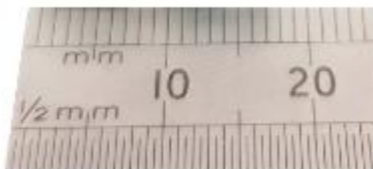
KraitArray™ V2 - Strain Member



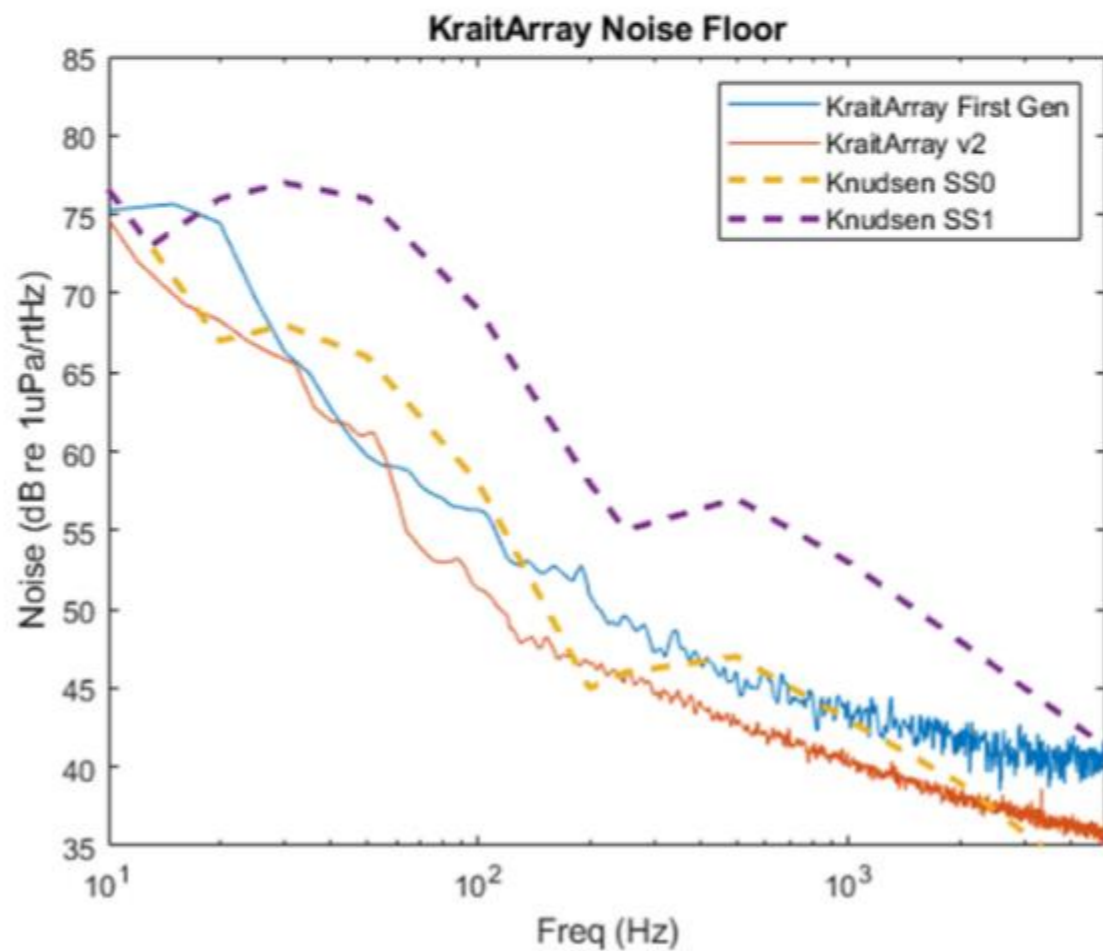
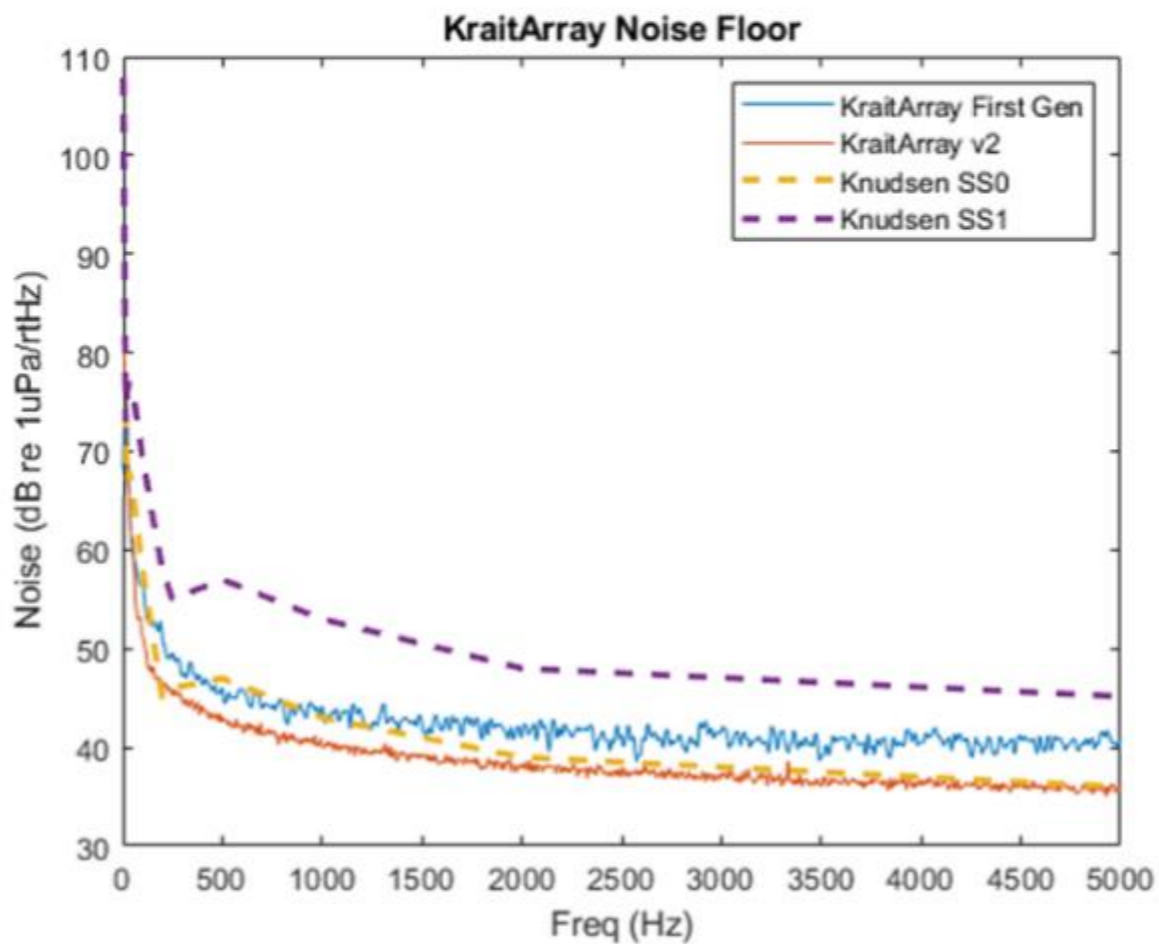
➤ Reduced array diameter reduces tow force – Benefit of TLTA

➤ KraitArray V2 strain member suitable for 28+ knot tow speeds

KraitArray™ V2 - Hydrophone



- Low noise
- Low power
- Built-in self test



KraitArray™ V2 - Digitisation System



8 channel, 24 bit digitisation node

Multi-drop digital backbone

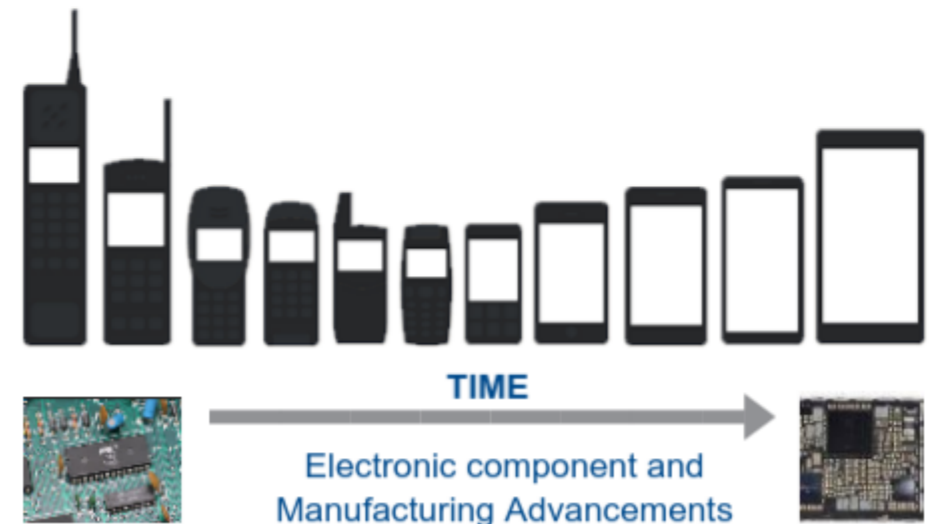
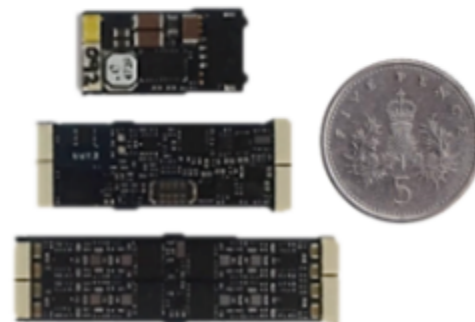
Distributable over length of array

10 mm width

Low noise

Miniaturization in electronic components due to smart phones and portable devices

Advances in PCB manufacturing techniques



KraitArray™ V2 - Inter-Module Connector



High Density Electrical Connector



Direct Metal Laser Sintering
(DMLS) Prototype Parts



Finite Element Analysis (FEA)



KraitArray™ Applications



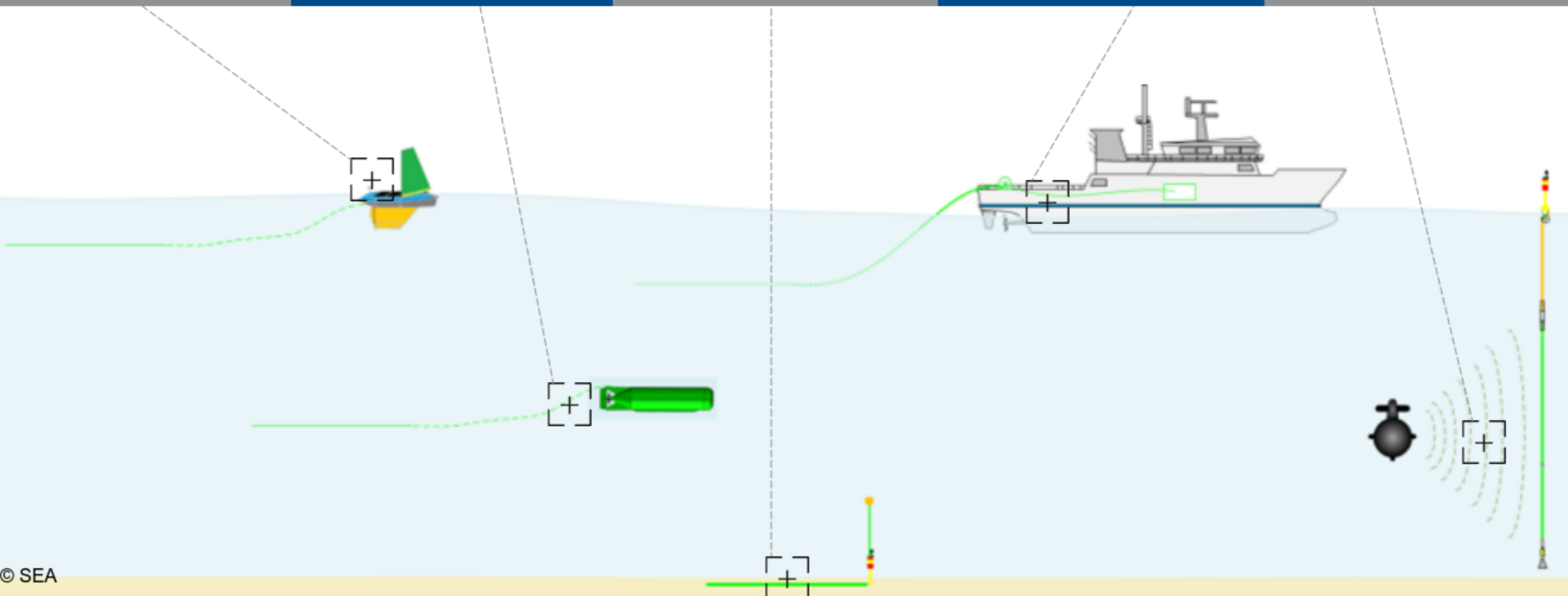
Unmanned Surface Vehicles

Unmanned Underwater Vehicles

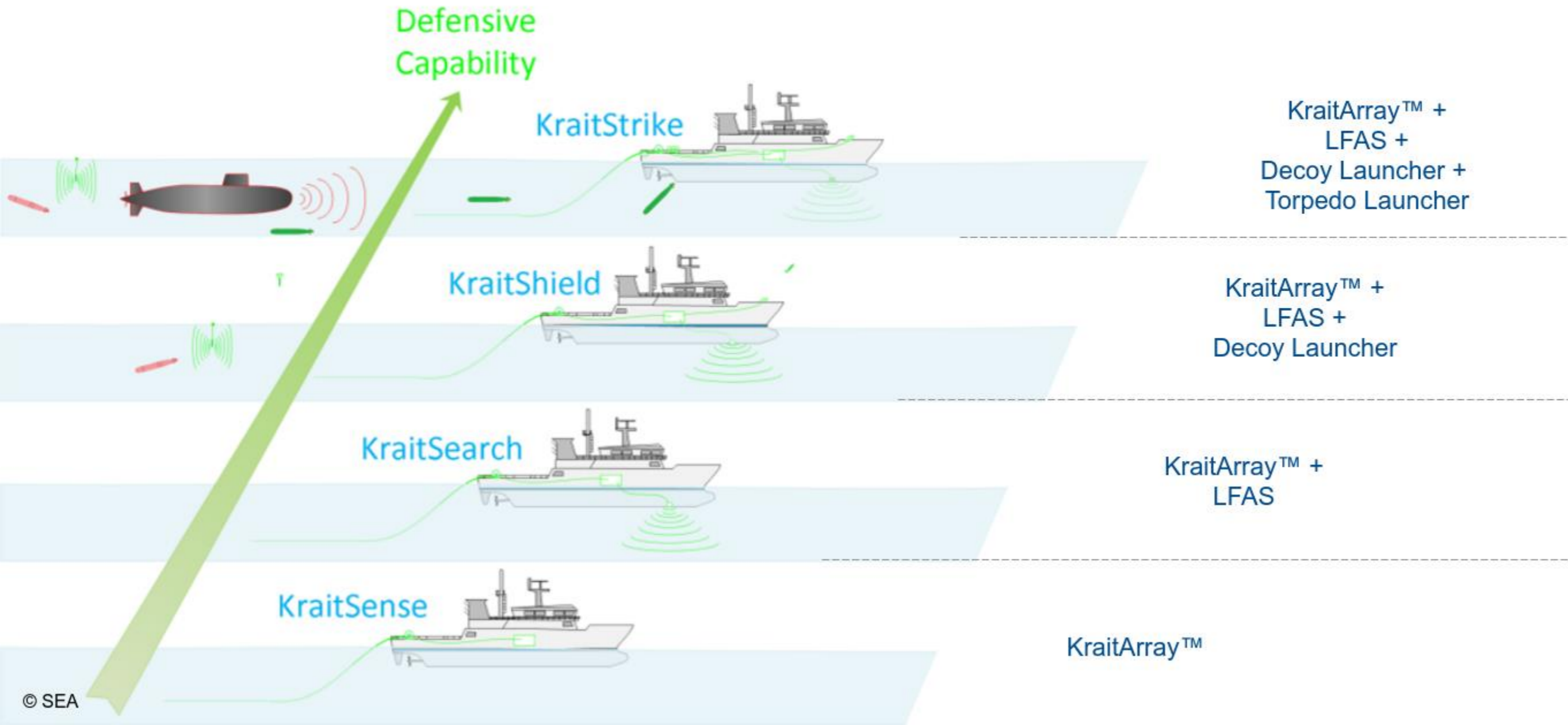
Seabed Mounted KraitArray™

Surface Vessels
(OPVs, IPVVs, Corvettes, Frigates)

Vessel Noise Ranging
(Fixed or Portable)



Krait Defence System (KDS)



Krait Defence System (KDS)

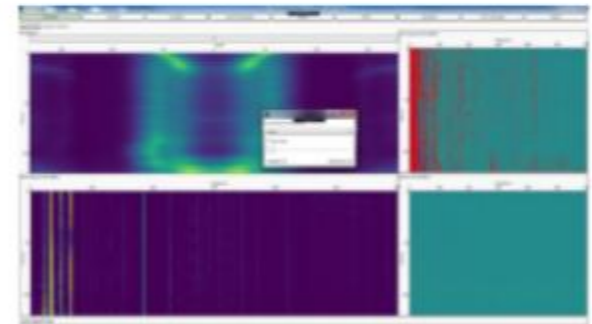
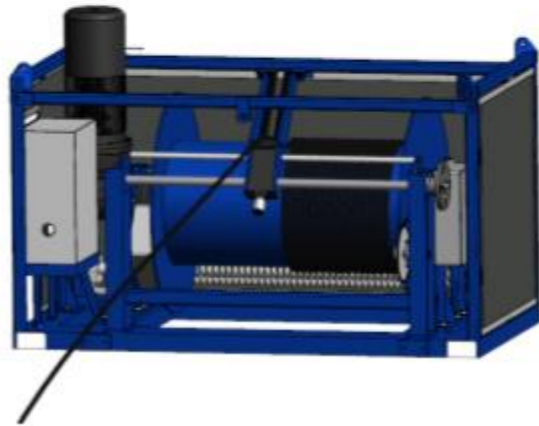


KraitArray™

Array handling system
and tow cable

Lightweight
rack enclosure

Krait Defence System
Software



Krait Defence System (KDS)



Provides ASW capability to smaller and multi-role vessels



Reduced initial and operating costs



Allows for cross-decking



Intuitive software interface



Low weight & drag

ASW Unmanned Applications



Predicted US \$3bn spend on Unmanned ASW assets in next 10 years



KraitArray™ key to operation of Unmanned ASW assets



Deployed from numerous vehicles since 2014, including:






- ASV C-Enduro
- AutoNaut
- Thales Halcyon
- BAE Systems P950 Autonomous Demonstrator RHIB
- Liquid Robotics Wave Glider








4 Wave Gliders during Unmanned Warrior 2016 towing KraitArray™



Features

-  Long endurance
-  Low purchase and operational cost
-  Removes personnel from hazardous environments
-  Covert
-  Use as node in multistatic operations

Challenges

-  On-board data storage
-  On-board sonar processing
-  Platform and data security
-  Data link bandwidth
-  Develop new CONOPS

ASW Unmanned Applications - Boeing Defence UK



Wave Glider and KraitArray™ autonomous unmanned system

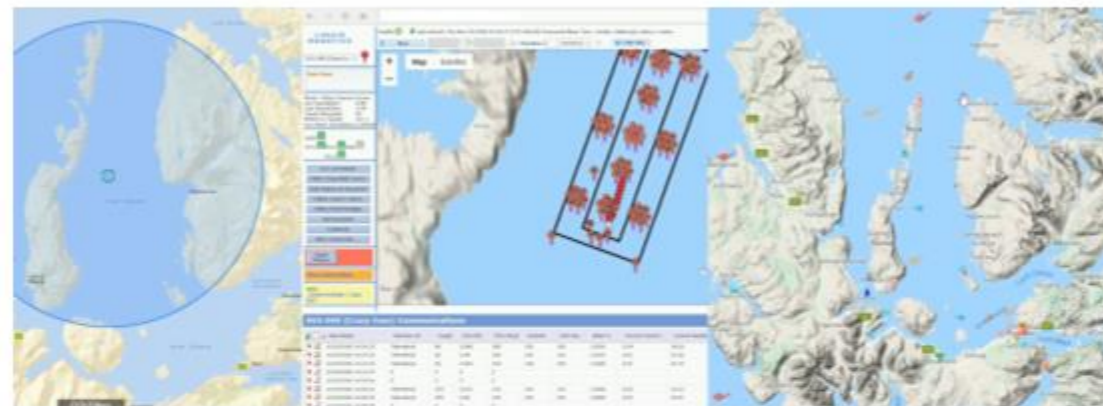
Kaon Ltd acoustic processing

ASW System with increased acoustic aperture

Trials performed in BUTEC

Successfully detected, tracked and reported simulated submarine target

Demonstrates autonomous ASW capability



Kaon

Innovation Deployed

Thank you
for listening

Questions welcome



SEA is located on stand B42

