



Enhanced ASW via Allied MAS Teaming

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Ministry
of Defence

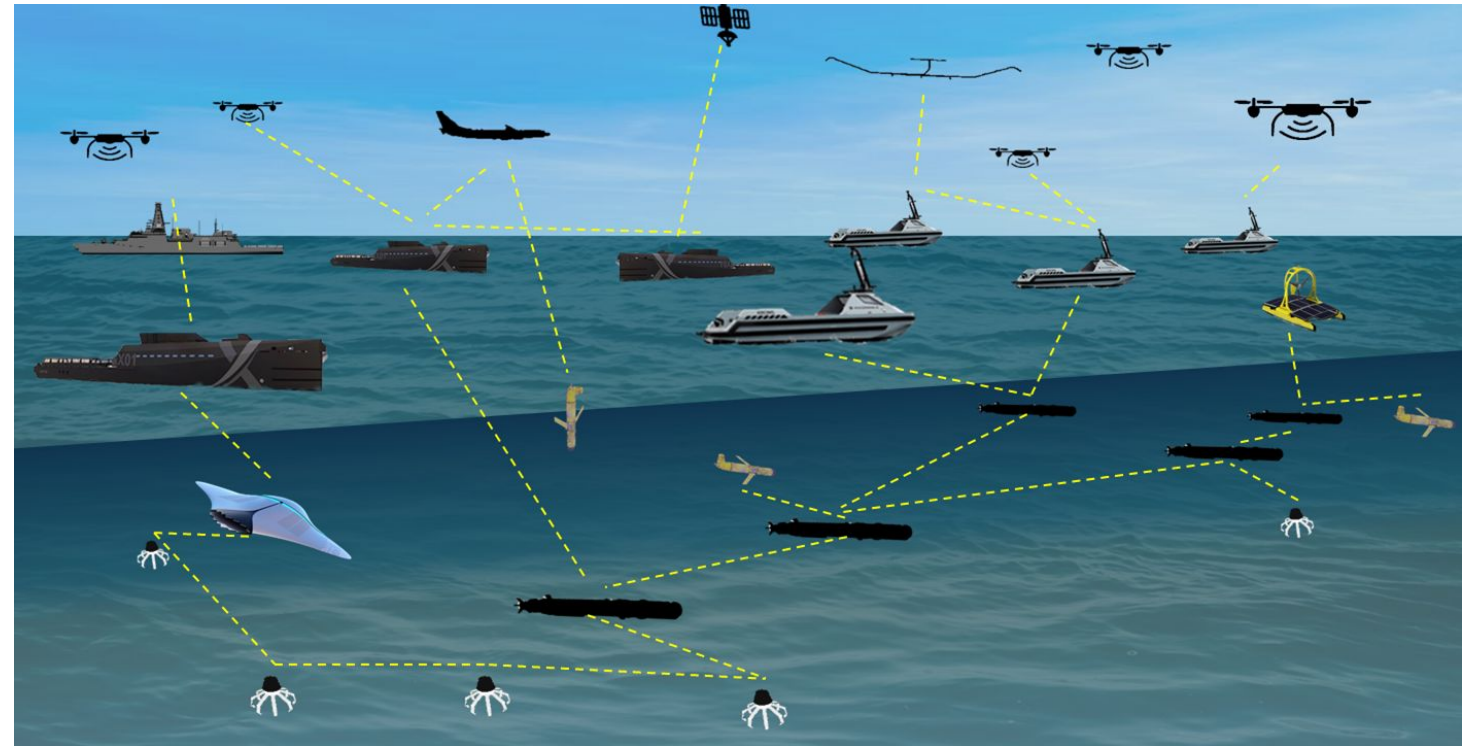
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■ Enhanced Anti Submarine Warfare via Allied Maritime Autonomous Systems Teaming

- ASW complex capability
- Multi-environment
- Multi-system
- Difficult Targets

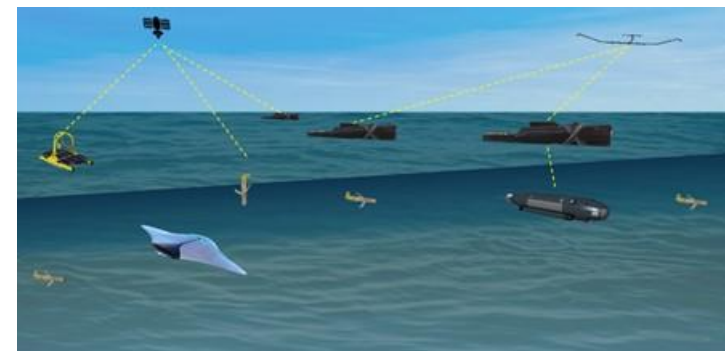
- NATO priority area
- Need Allied collaboration to be effective



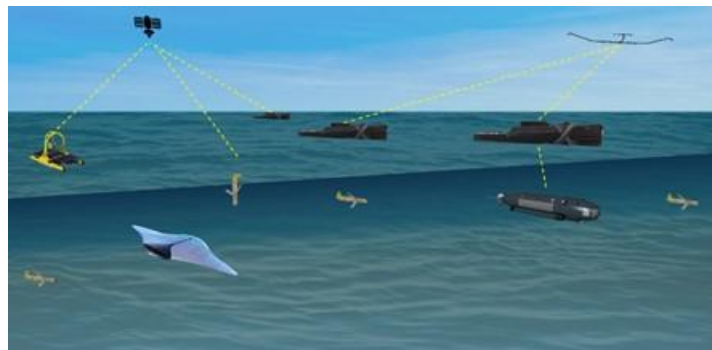
- **Autonomy Approaches**
 - Hosted
 - Global
 - Squads
 - Peer Partners
- **MAS ASW Challenges**
- **NATO ASW Barrier Smart Defence Initiative**



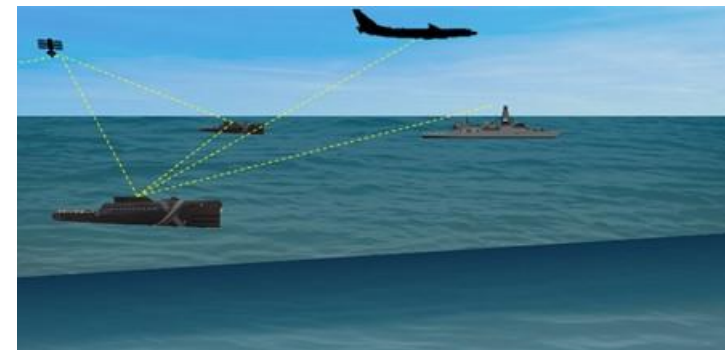
Hosted



Global



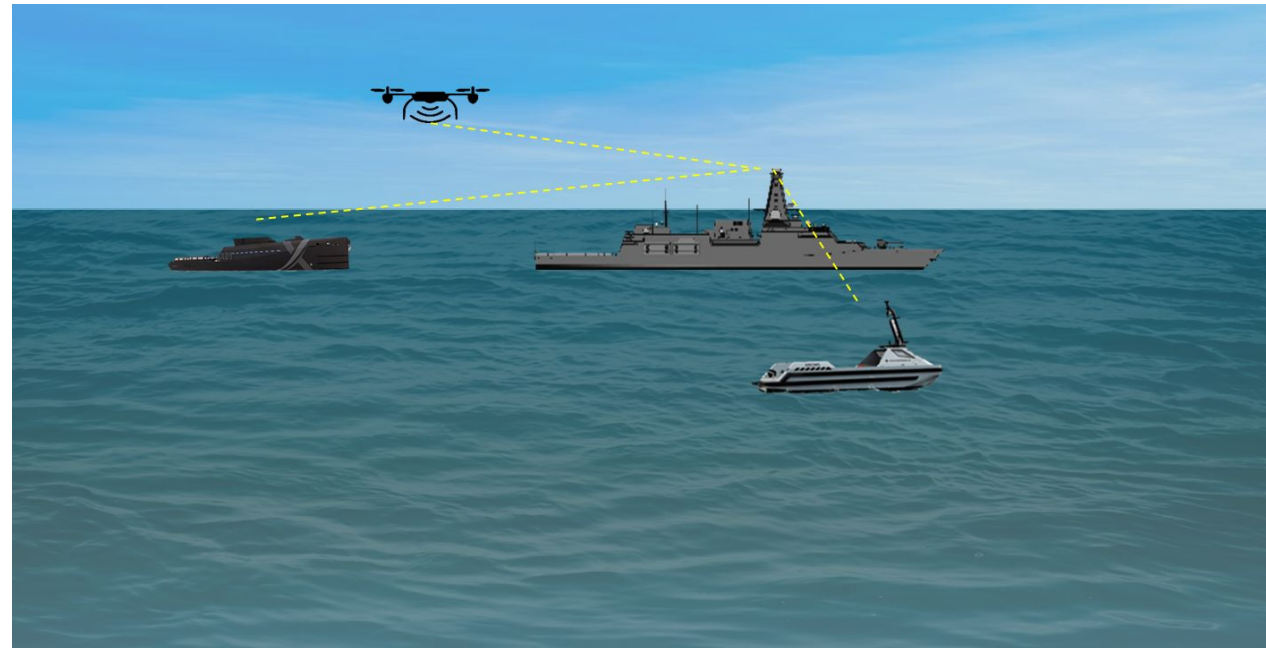
Squads



Peer Partners

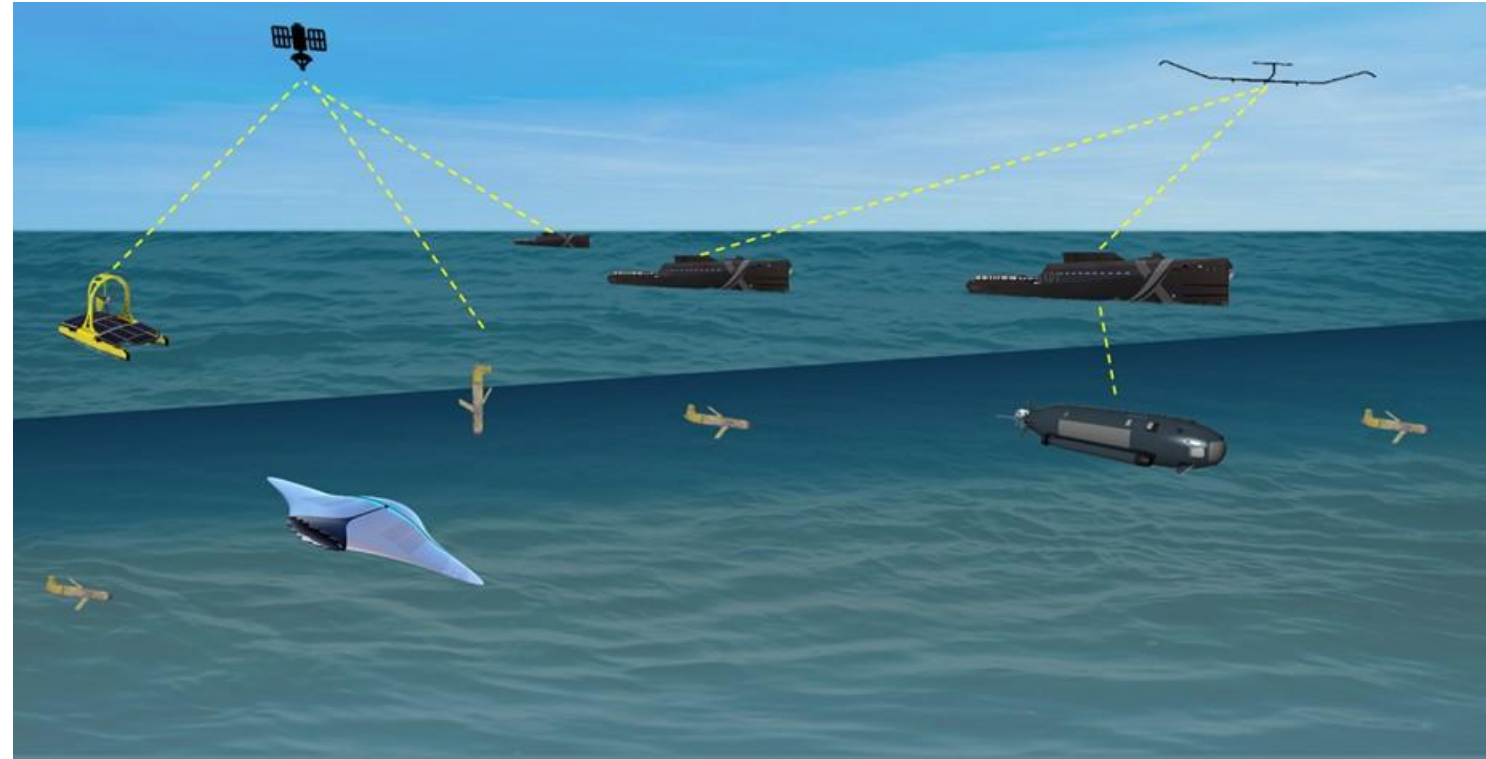
Key Concept Families – Hosted

- Adds a capability extension to the host
- Organic
 - Vehicles deployed from a capital platform
- Shadow
 - Larger vehicle, supporting a capability extension to the host platform
- Mission Autonomy - Low
- Automated Maintenance - Low
- Communication - High

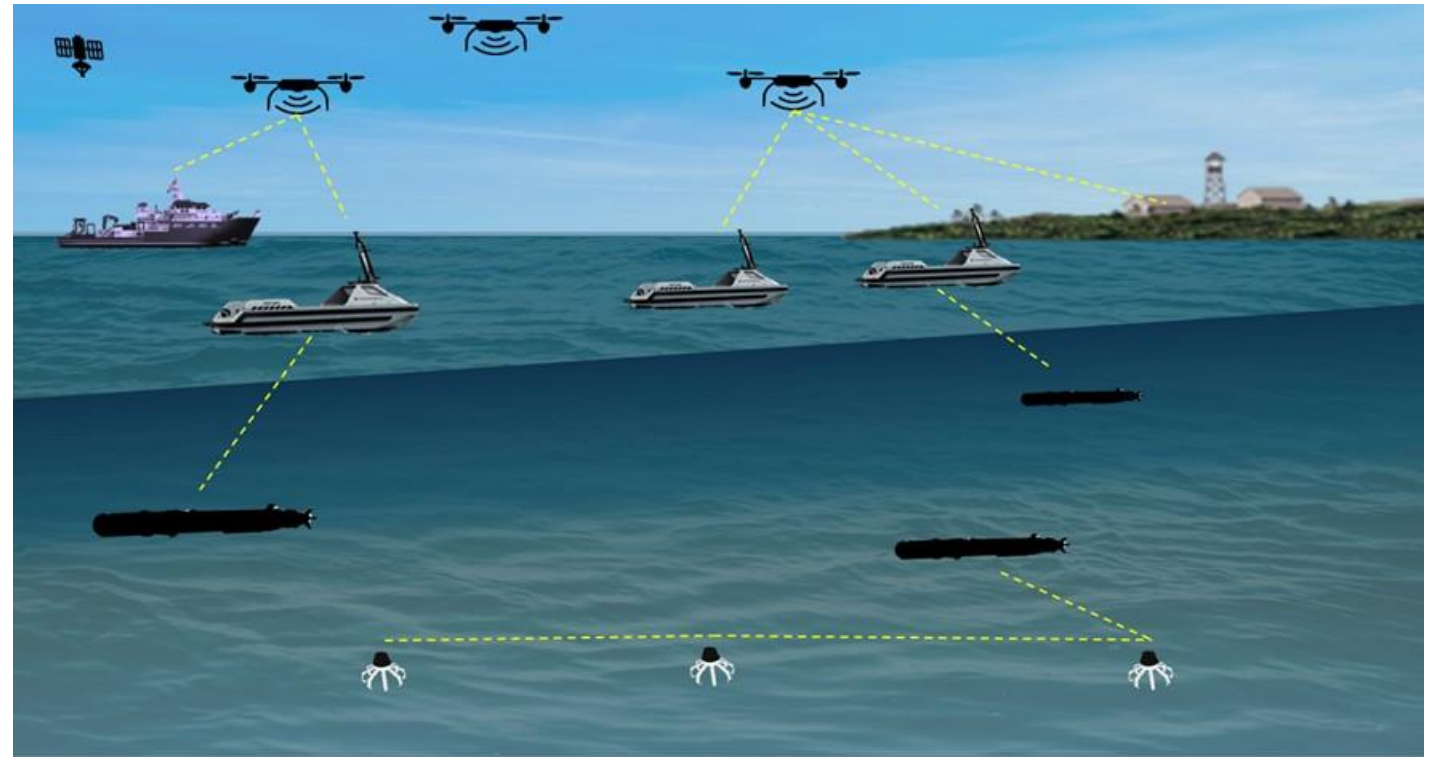


Key Concept Families - Global

- Global deployment operating largely independently
- Predominantly operated from UK
- Large vehicles capable long duration deployment
- Small, numerous, persistent systems
- Mission Autonomy - Medium
- Automated Maintenance - High
- Communication - Low



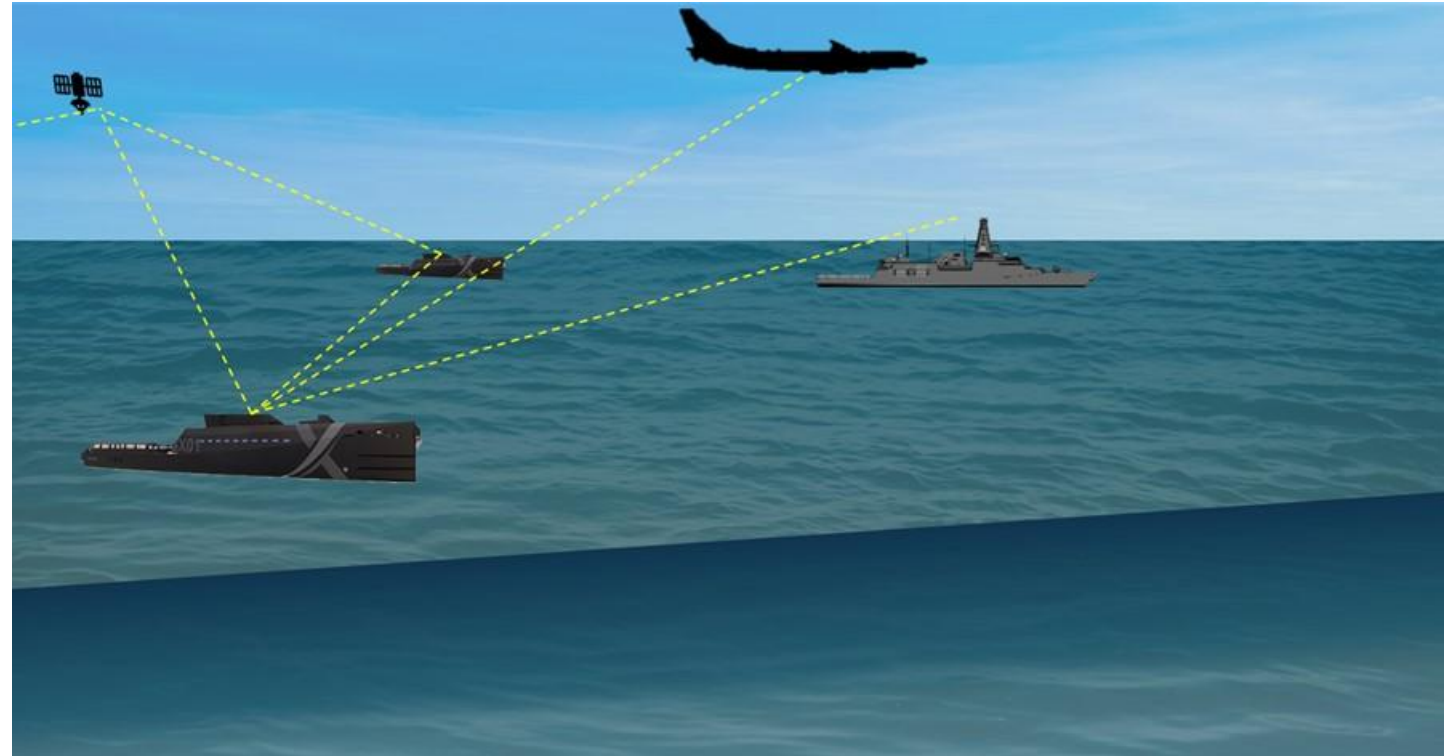
- Multiple systems working as a team, operated by small number of personnel
- Rapidly deployable with or without capital or support platforms
- Collaborative systems working across domains



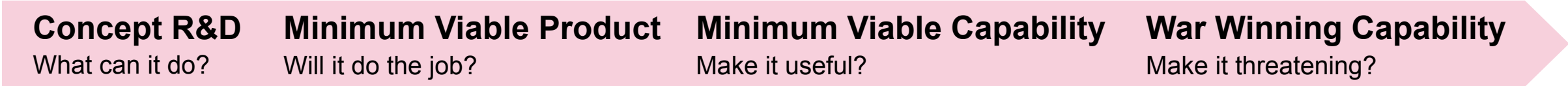
- Mission Autonomy - High
- Automated Maintenance - Medium
- Communication - Medium



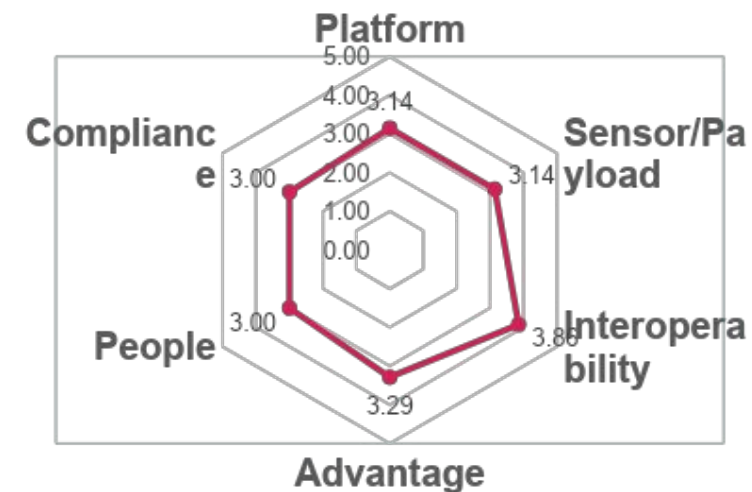
- Global systems
- Working in collaboration with Crewed Warships
- Indistinguishable from another Warship from an integration perspective
- Mission Autonomy - Low - High
- Automated maintenance - High
- Communication - Low - High



Common Maturity Framework (CMF)

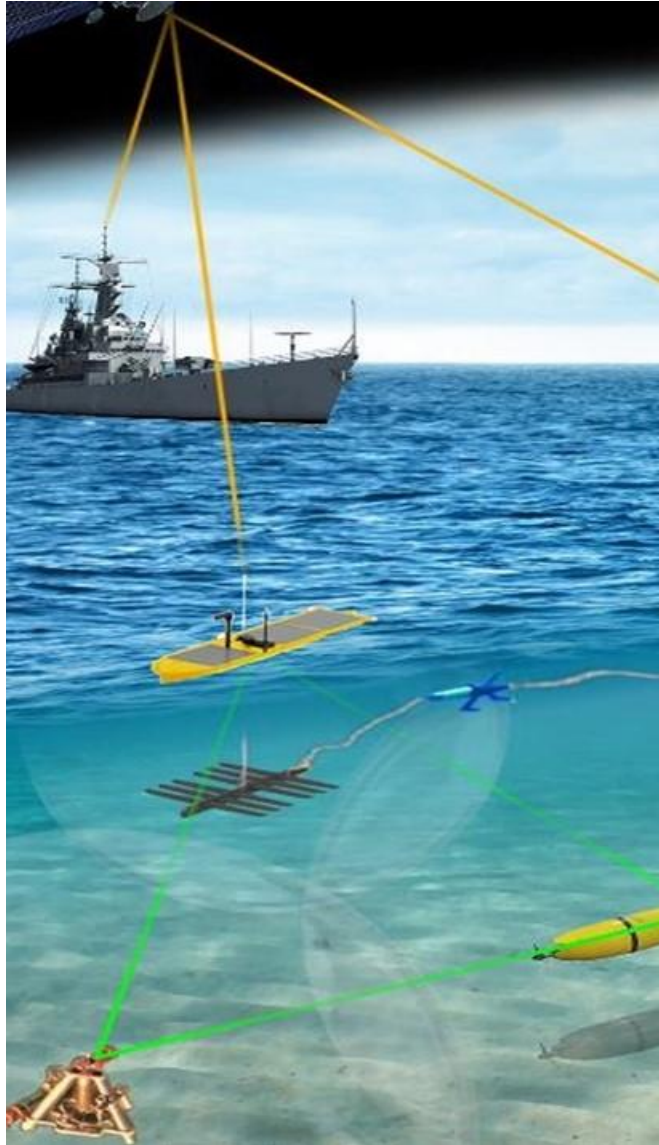


- CMF is a discussion handrail to establish a collective understanding of maturity and development priority for human and technology factors that must be, at some point, addressed to deliver an end vision involving Autonomous Systems



Challenges for a Minimum Viable Product

Advantage	Consent & Confidence	Platforms & Payloads	Data & Algorithms	Integration & Interoperability	Expertise & Enterprise
Concept Definition & Adaptability	Legal & Regulatory	Deployability	Data Requirements	Open Architecture & Standards	People & Training
Benefits	Policy & Risk Appetite	Power & Endurance	Availability & Access	Human-Autonomy Teaming & Control	Organisational Readiness & Governance
User Needs	Security	Navigation & Positioning	Autonomous Functions	Communication & Networks	Support & Infrastructure
Risk	Trust	Reach	Data Processing	Physical Integration	Cultural Acceptance
Cost	Resilience	Accuracy	Data Quality	Command & Tasking	Ethics
Scalability	Survivability	Reliability	IX & Decision Support	Allied Interoperability	Acquisition & TLMCM



NATO ASW Barrier Smart Defence Initiative (SDI)

Innovating through collaboration

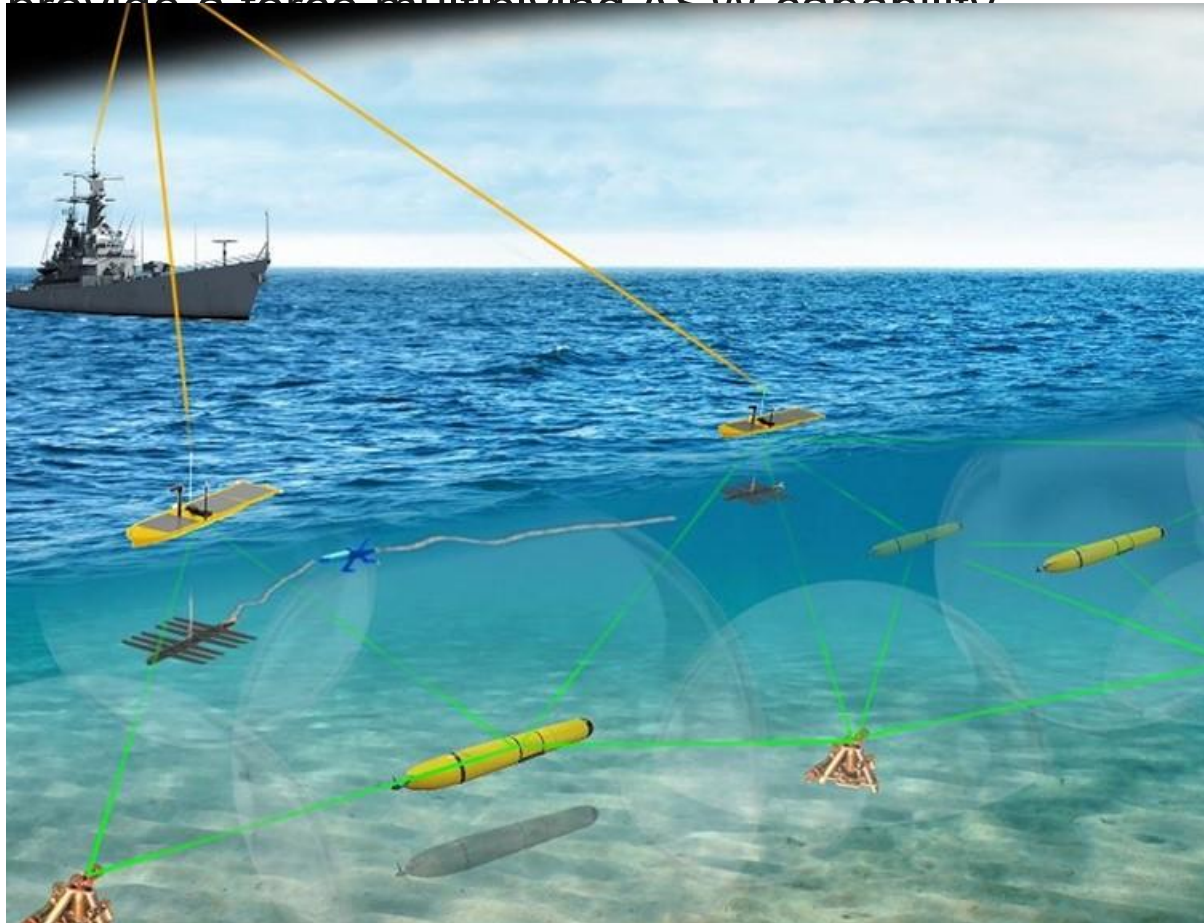
Closing Capability Gaps

Putting Interoperability First



Mission:

To develop a technical demonstrator comprising both legacy and interoperable MUS solutions to securely provide a force multiplying ASW capability



ASW SDI Nations

Australia, Canada, Denmark, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, UK, US, Sweden

Approach

- Collaboration through National Programmes
- Exploiting Operational Experimentation
- Funded Industry Challenges

Value through Collaboration

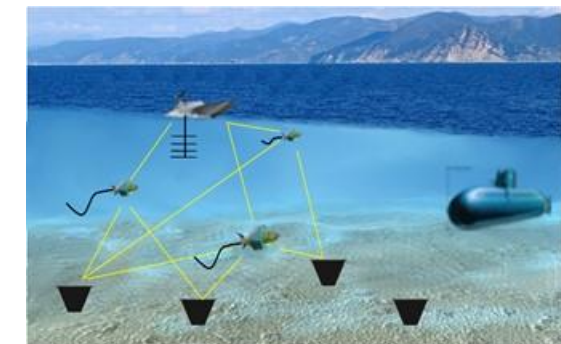
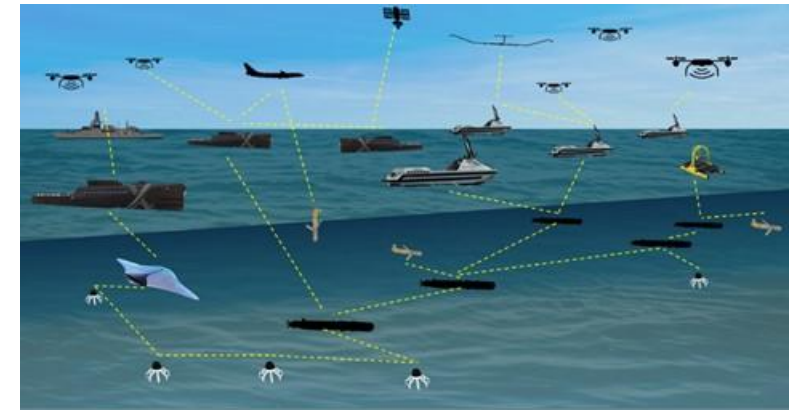
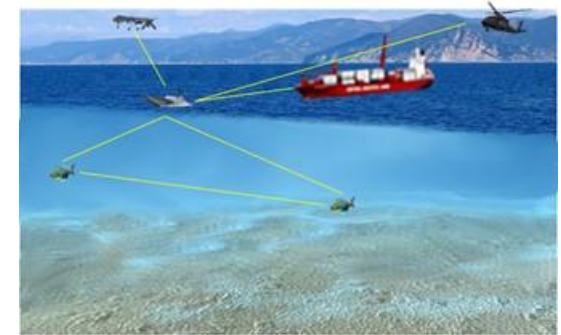
Sharing Releasable elements of National Programmes



The ASW Smart Defence Initiative provides a Community of Interest for national collaboration and information sharing on a bilateral or multilateral basis for mutual benefit

■ Missions

- **Hold at Risk - Choke point operations**
- Hold at Risk - Protection of friendly harbour
- Sea Shield - Protection of a sea base
- Sea Shield - Protected Passage High speed
- Wide area - Persistent Surveillance



ASW Barrier SDI - Shared Challenges

- WP-A
Performance Assessment



- Common MUS Taxonomy
- Access to a library of MUS performance assessments

- WP-B
Command Control (C2) and Interoperability



- Access to and influence over a NATO ASW Barrier Target Architecture
- Common standards to ensure interoperability

- WP-C
Data, AI, Security and M&S



- Access to (and influence over) a common ASW Barrier Data Model and Definitions
- A Secure and Robust environment for Data Exchange

- WP-D
Maturity Framework and Analysis



- Access to standardised concepts for baselining performance assessment
- Common Autonomous Systems assessment methodology

- WP-E
Doctrine and Concepts

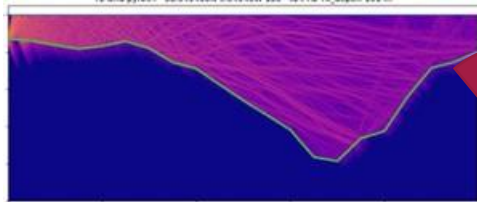


- Access to defined KPRs as a basis for measuring system of system performance
- Access to ASW Barrier CONEMP and Vignettes

■ ASW Achievements

- Exploiting International REA products for ASW
- Optimised centralised planning
- Tasking of assets across nations
- Real-time detections to fed MOC via C3MRE
- Collaborative Autonomy between UW assets
- Common picture - common across UK, CMRE, IT CMS

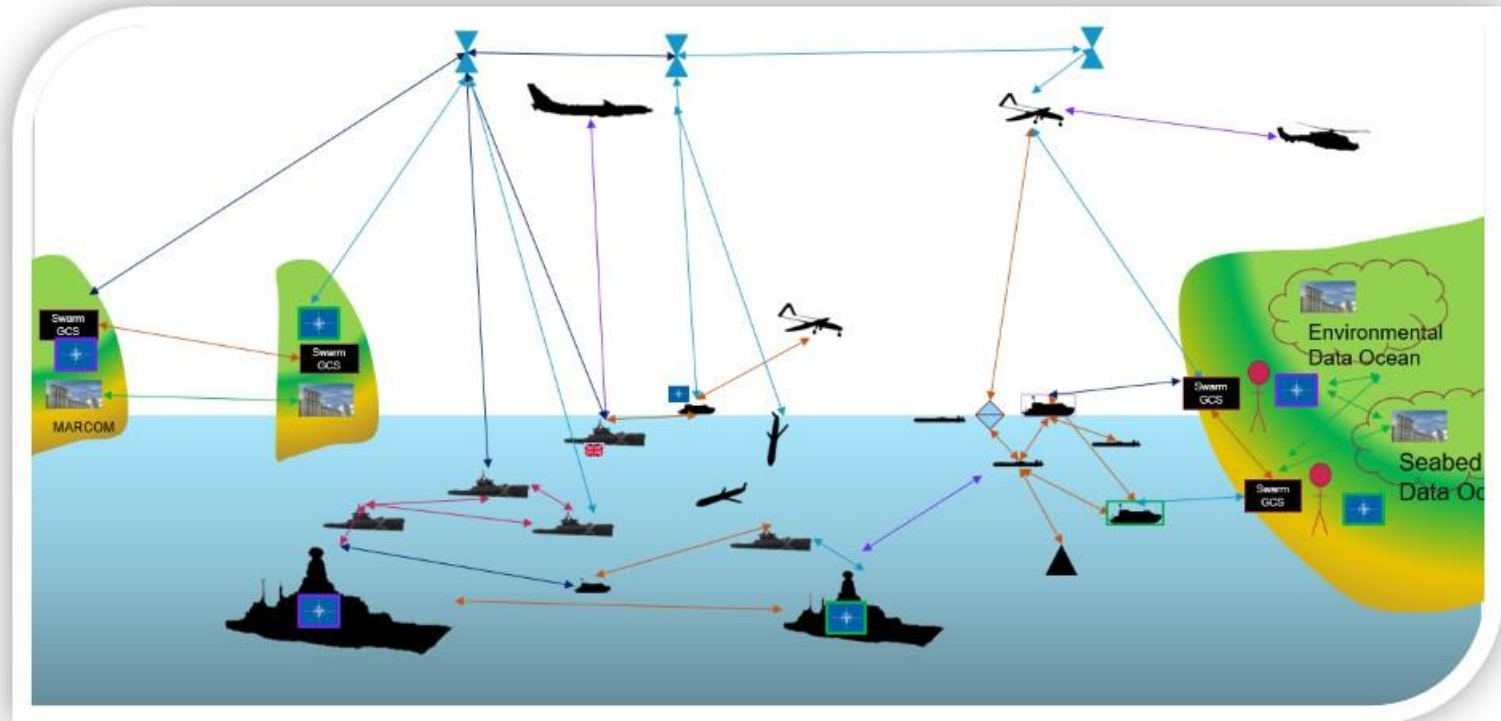
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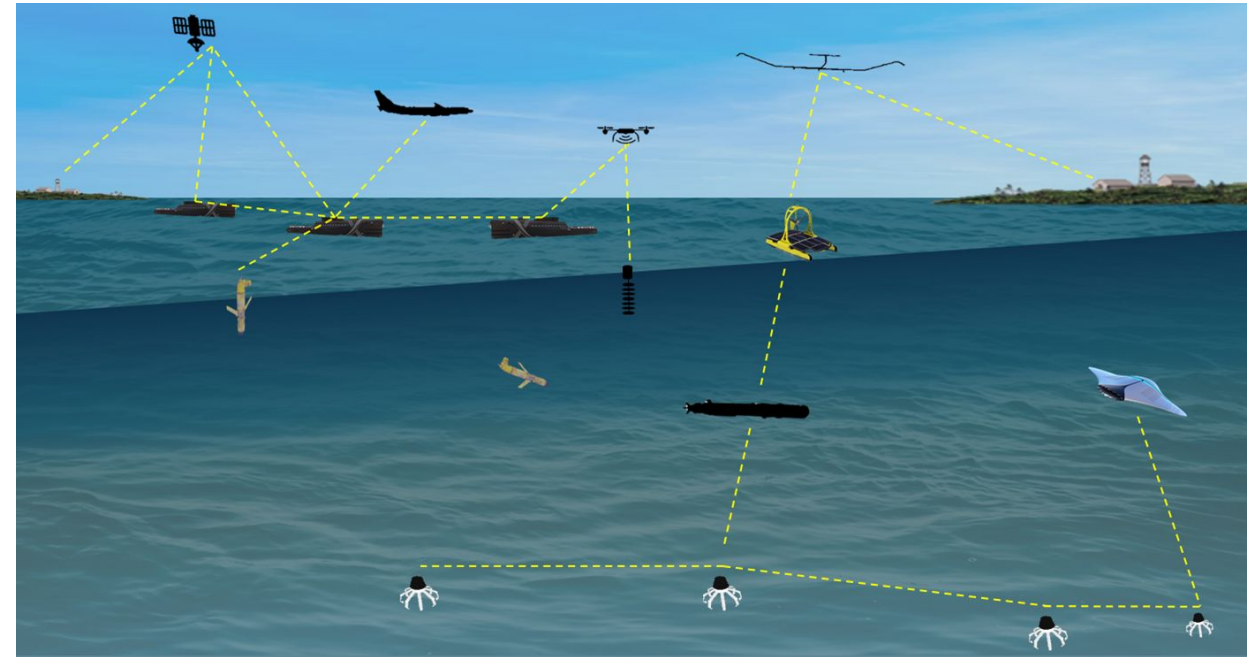
Allied Underwater Battlespace Mission Network (AUWB-MN)

- A definition and physical instantiation
- Guidance on technology, standards and processes to address any shortfalls

- Architecture
- Data fusion harvesting
- Curation, and management
- Integration of physical instantiation



- ASW is a challenge
 - Complex environment
 - Difficult targets
 - Communication Constraints
- Ambitious programme of work
 - Centralised to decentralised
 - Resilience
 - Pan NATO
 - Pace
- Industry Government Collaboration
 - Systems solutions
 - Networks and Standards
 - Concepts and opportunities





Questions



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