UNDERWATER DOMINANCE

THE FUTURE UNDER WATER BATTLESPACE – A ROYAL NAVY PERSPECTIVE
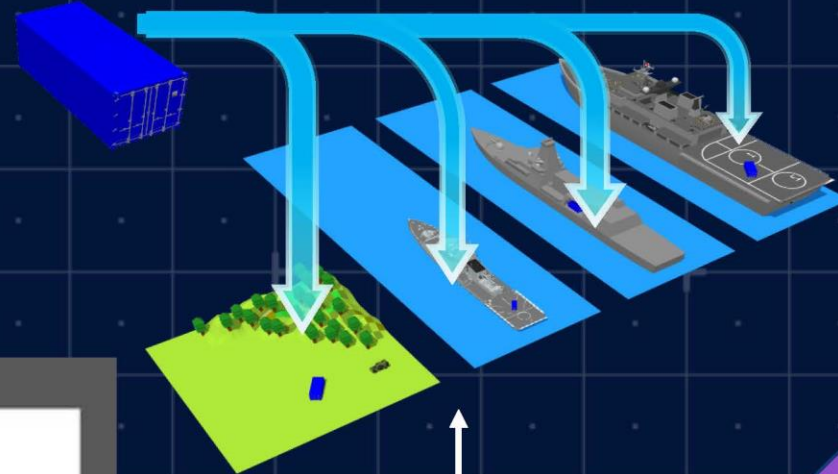
CNE 24

CAPTAIN MICHAEL WOOD RN – HEAD UWB CAPABILITY
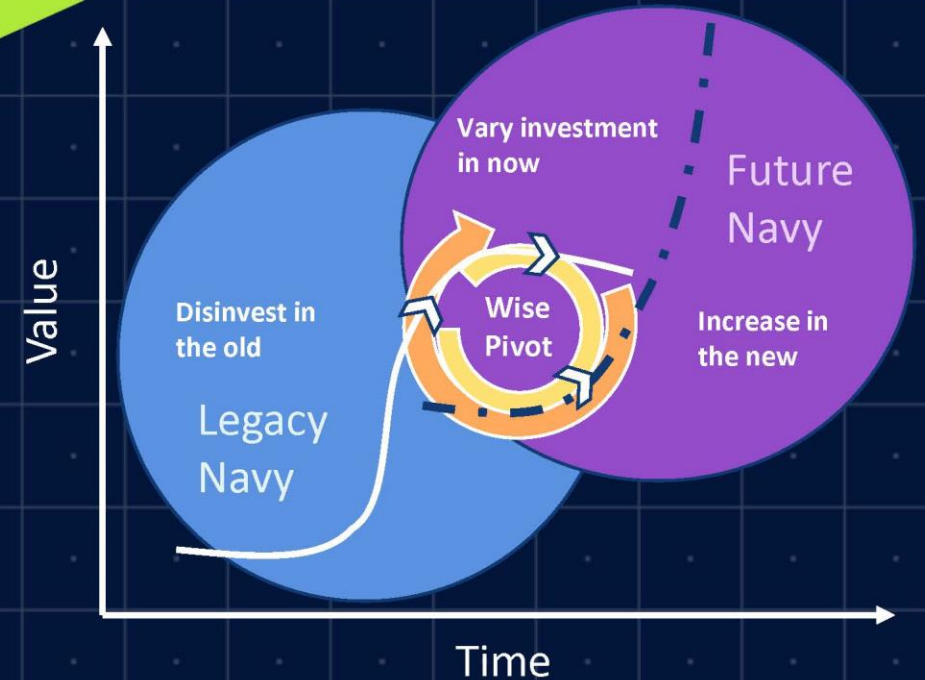
Autonomy and the Future Force

The Maritime Operating Concept Themes:

- Becoming a Distributed Protean Force
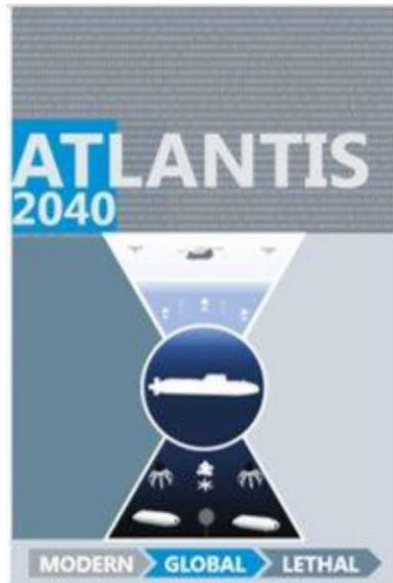- Adopting a System of Systems Approach
- Executing the Wise Pivot

Capability not platform focussed 'Podular' with disaggregated sensors, deciders, effectors and enablers connected via a Navy 'mesh network'

CARRIER STRIKE
PROTECT
ESF
OANA
LRG(N)
ENGAGE
LITTORAL STRIKE
T31/OPV
CONSTRAIN
LRG(S)
PERSISTENT ENGAGEMENT
CSG
T31/OPV
OPV
WARFIGHT

Value

Vary investment in now

Future Navy

Disinvest in the old

Wise Pivot

Increase in the new

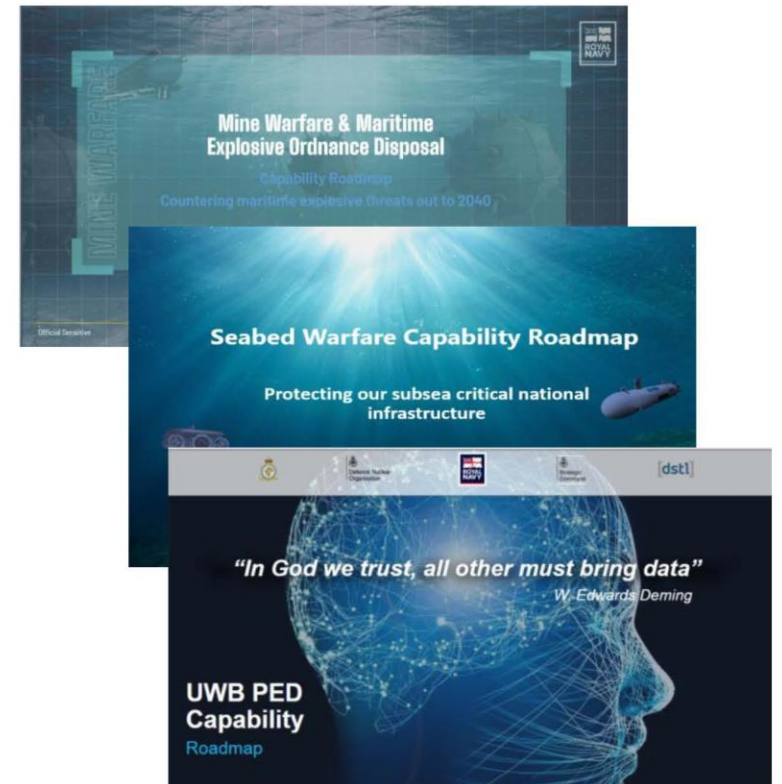Legacy Navy

Time

We have re-imagined our Domain...

VISION

A HYBRID CAPABILITY THAT DOMINATES IN A NETWORKED AND DIGITALISED BATTLESPACE

CONCEPTS

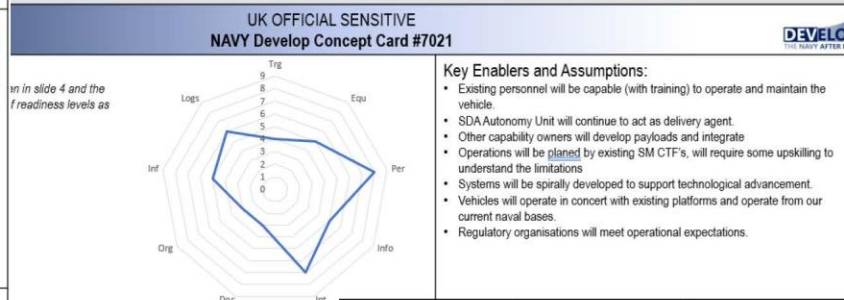WE MUST EXPLOIT OUR ADVANTAGE NOW & PROTECT IT INTO THE FUTURE

ROADMAPS

NAVY Develop Concept Card #7021 — Extra-Large Uncrewed Underwater Vehicle (Project CETUS)

Last Updated: | **UK OFFICIAL SENSITIVE** | **DEVELOP** THE NAVY AFTER NEXT | **Planned ISD:** Nov 2024

SoSA Level: L3	**Sponsor:** UWB
POC: Lt Cdr Andrew Witts MBE — Develop UWB Autonomy	
NATO Capability Code: [As defined in Link] NSK	**CC Name:** Naval Conventional Submarine
Capability Target: [NATO blue book] M3103.10a	

Strategic Context:

Increasing mass and sensor persistence to deliver Operational Advantage in the North Atlantic can be accelerated and supported through the application of autonomous robotic vehicles. In order to deliver the necessary mission endurance and sensor support a vehicle of sufficient size will be required.

Project CETUS is the delivery of an eXtra Large Autonomous Under Water Vehicle (XLAUV) which can serve as a representative platform for the demonstration of payload delivery in the covert battlespace.

Capability Description:

CETUS will be a purpose built military representative XLAUV with 7 days endurance (expandable by addition of more batteries). It will have an 8 cubic meter (1.6m x 1.6m x 3.2m) payload bay with dedicated support for payload integration. The vehicle will have a operating depth in excess of the current and planed SSNs, thereby supporting greater reach into the ocean through augmentation of the existing fleet.

Project Benefits:

Based on CETUS, future XLAUVs will expand the operational envelope of the Royal Navy by providing a versatile platform capable of hosting capabilities from payloads. The Royal Navy will use CETUS to develop operational doctrine to support the successful operation of XLAUVs in support of strategic objectives

Current ROM Costings: ROM - £15M per vehicle.

Risks:
- ASW SPEARHEAD funded only to demonstration stage
- Nascent technologies and concepts
- Lack of regulatory support.

OFFICIAL-SENSITIVE

NAVY Develop Concept Card #7021 (continued)

UK OFFICIAL SENSITIVE — **DEVELOP** THE NAVY AFTER NEXT

...n in slide 4 and the ...f readiness levels as

Key Enablers and Assumptions:
- Existing personnel will be capable (with training) to operate and maintain the vehicle.
- SDA Autonomy Unit will continue to act as delivery agent.
- Other capability owners will develop payloads and integrate
- Operations will be planed by existing SM CTF's, will require some upskilling to understand the limitations
- Systems will be spirally developed to support technological advancement.
- Vehicles will operate in concert with existing platforms and operate from our current naval bases.
- Regulatory organisations will meet operational expectations.

Potential Usability and Application

The versatility of the system delivers capabili... from payload integration. Possible applicatio... studies completed by OAC and DSTL show ... operational use cases that cover, but are no... (specific use cases are at SECRET and abo...
- SSN Augmentation
- Sea Bed Warfare (Find, Fix and Effect)
- ASW
- Under-Ice operations
- ISTAR (littoral operations)
- COMINT
- SF support
- Covert Surveillance
- Permanent Sensor/Mine deployment

...re space on the...
- Naval Base support continues.
- Design of future SSN fleet to support augmentation.
- Industrial growth to support future expansion.

OFFICIAL-S...

Common Maturity Framework

Advantage		Consent & Confidence		Platforms & Payloads		Data & Algorithms		Integration & Interoperability		Expertise & Enterprise	
Concept Definition & Adaptability		Legal & Regulatory		Deployability		Data Requirements		Open Architecture & Standards		People & Training	
4	2	3	1	4	4	4	1	4	2	2	1
Benefits		Policy & Risk Appetite		Power & Endurance		Availability & Access		Human-Autonomy Teaming & Control		Organisational Readiness & Governance	
3	2	4	1	2	3	3	3	3	2	1	4
User Needs		Security		Persistence		Autonomous Functions		Communication & Networks		Support & Infrastructure	
2	1	1	1	3	4	5	4	5	1	2	1
Risk		Trust		Reach		Data Processing		Physical Integration		Cultural Acceptance	
2	2	4	2	4	2	3	1	4	1	3	3
Cost		Resilience		Accuracy		Data Quality		Command & Tasking		Ethics	
4	3	3	2	3	1	4	2	2	2	4	4
Scalability		Survivability		Reliability		IX & Decision Support		Allied		Acquisition &	
1	3	1	3	2	1	1	1				4

DEVELOP THE NAVY AFTER NEXT

AUTOMATION & AUTONOMY

DIGITALISATION

ENHANCING MODULARITY

Three Transformations are underway

LETHALITY

SEABED WARFARE

AUTONOMY


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THE NAVY AFTER NEXT

LETHALITY

The Lethality problem and what are we doing about it

The threats to our security and economic prosperity are evolving fast

Driven by a return to an era of Great Power competition and accelerating technological advances

Potential advisories are investing a greater proportion of their defence budgets in offensive as opposed to defensive systems/survivability

The decline in platform numbers, erosion of weapons stockpiles, cliff edges in capability and underfunding of key capabilities drive compound risks
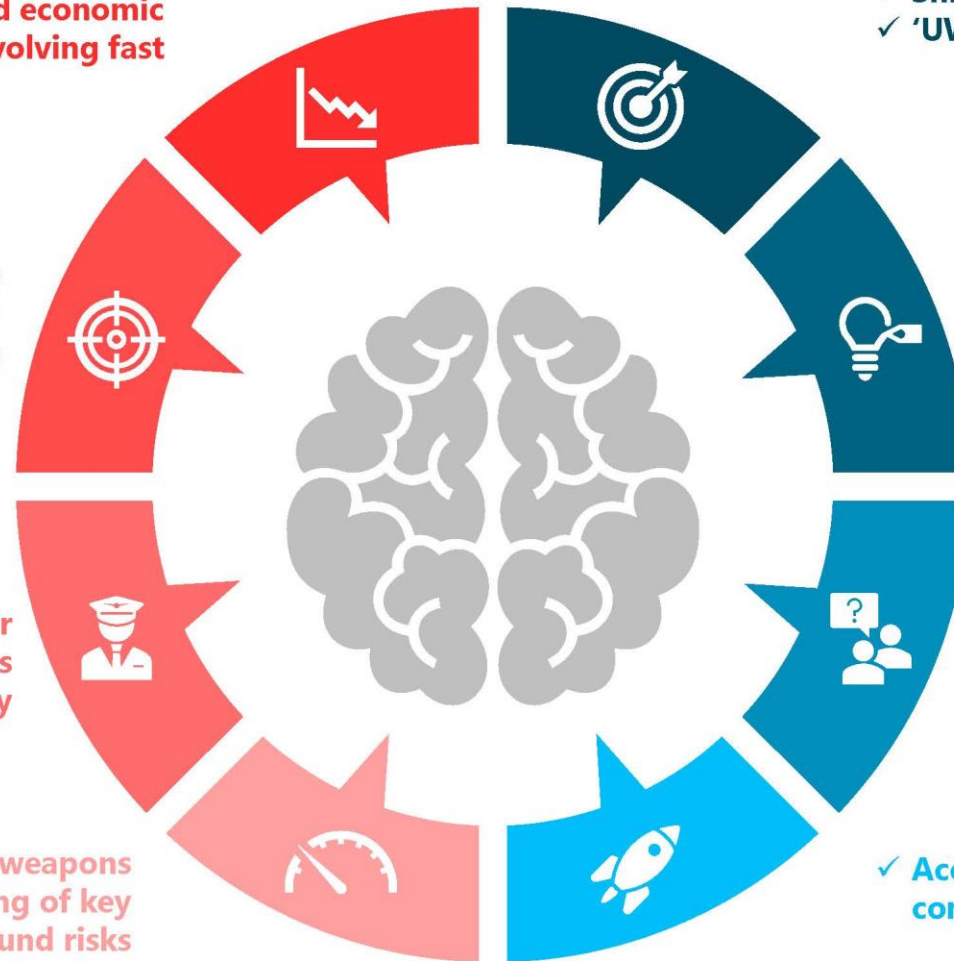
✓ Shifting our mindset from defence to offence
✓ 'UWB OPERATING CONCEPT'

✓ Embracing divergent thinking

✓ Challenging the programme of record
✓ 'LETHALITY ROADMAP'
✓ Lethality Spearhead?

✓ Accelerating experimentation and establishing the conditions to deliver capability quicker

The ability to **persistently** hold the threat at risk **at range**
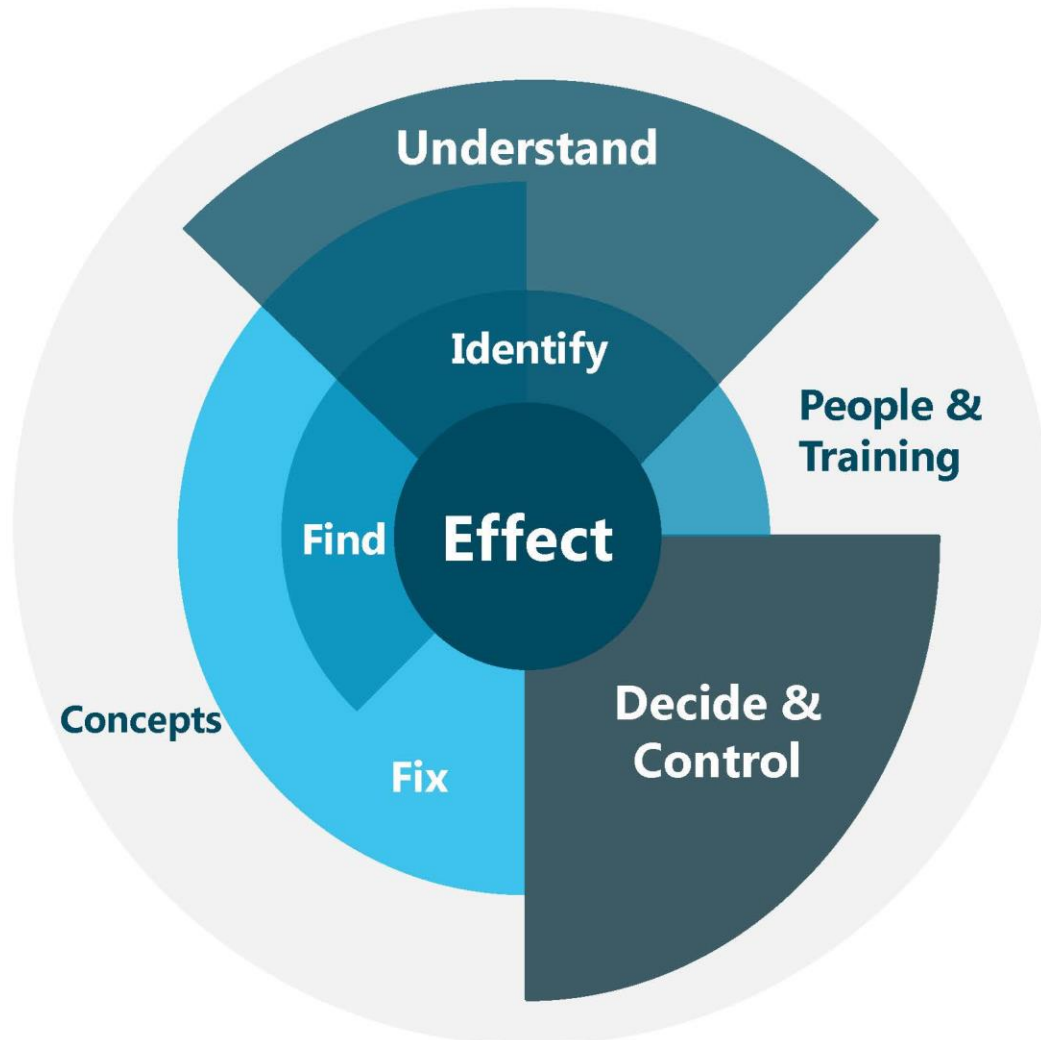
A high-level model of lethality

So what?

- Given the associated operational challenges, our fighting effectiveness must be credible and focussed on **delivering lethal effect**

- This is central to the idea of modern deterrence, vital to retaining a central role in NATO and essential if we are to be truly **interchangeable with allies**.

- We require a **different mix of capabilities** both conventional and autonomous,

- Driven by a shift from a defensive mentality to a more **offensive approach to maritime operations**.

- Our development and pathway to increasing lethality must considers these elements as part of the overall '**system-of-systems**'

1. The capacity to cause death or serious harm or damage

SEABED WARFARE

Navy has established cross-Defence leadership of SBW...

- MoD has directed Navy lead Command status
- Strategy captured in a SBW Capability Roadmap.
- Capability development cohered through 2* UWB Capability Management Groups (CMG) and 1* SBW Capability Planning Group (CPG) with cross cutting campaign plan.
- Regular engagement and advocacy from Ministers.

**A global leader in a nascent warfare discipline...**

- Our strategy is helping shape other nations' approach and we have backed up with 'action' to deliver.
- We are collaborating under AUKUS Pillar 2, NATO and UK/NOR Strategic USW Partnership.
- Spearhead and AUKUS Research & Development being used to rapidly develop prototypes.
- Provide choice through a related menu of SBW programme options.

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SEABED WARFARE

RFA PROTEUS and tranche 1 systems...

- Rapid Commercial procurement of the MROS platform
- Tranche 1 COTS systems procured separately
- Data is king
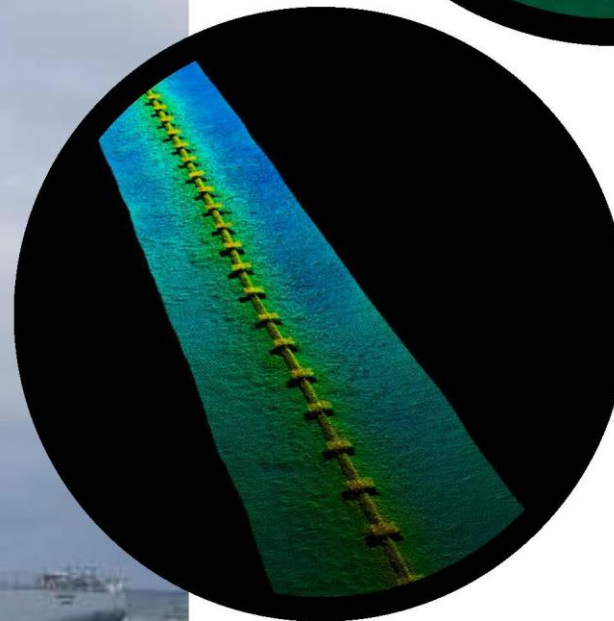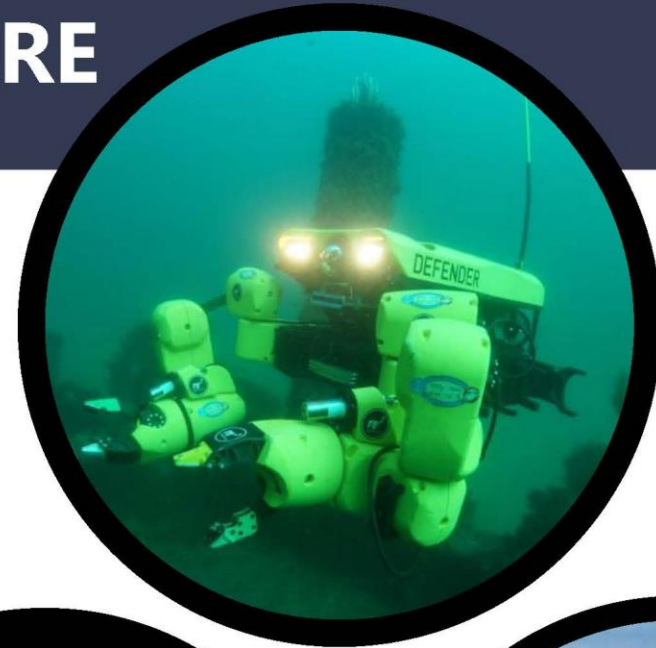
Autonomy: We have ambition in all environments…

SURFACE

AIR

SUB-SURFACE

CHARYBDIS

PROTEUS

CETUS

Cutting-edge **autonomous minehunting system technology** enters production for **UK Royal Navy**

World-class systems include:
→ Portable Operating Centre
→ Autonomous Surface Vehicle
→ Towed Sonar
→ Mine Neutralisation Equipment

215 highly-skilled UK jobs sustained and created in **Somerset, Plymouth, Aberdeen and Glasgow**

Remotely operated minehunting system will reduce risk to Royal Navy personnel from modern threats

Autonomous Surface Vehicle
12 metres in length and capable of carrying **multiple task-specific payloads**

will be able to remotely detect and neutralise mines from a safe distance

UK invest £184M in joint programme **with France**

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Autonomy: Technology Challenges and what we need
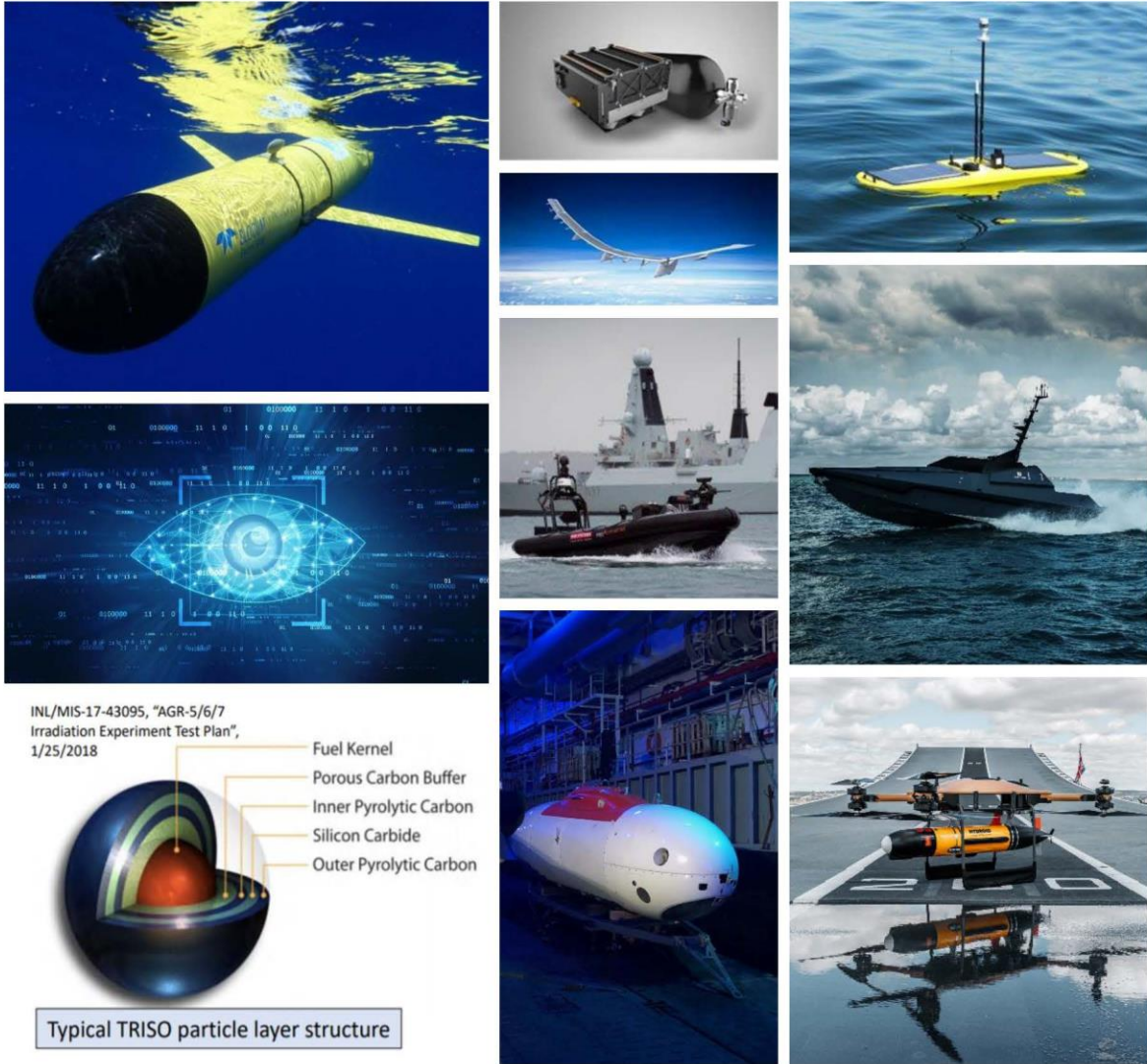
AUTONOMY	Scaled, Developed, Tested
SWARMING	Multiple Meshed UxV in Multiple Environments
MODULARITY	Payload-agnostic, Open Architecture and Access to IP
ENDURANCE	Weeks and Months, not Hours
LIVING AT THE EDGE	Resilient, Secure Bandwidth

INL/MIS-17-43095, "AGR-5/6/7 Irradiation Experiment Test Plan", 1/25/2018

Fuel Kernel
Porous Carbon Buffer
Inner Pyrolytic Carbon
Silicon Carbide
Outer Pyrolytic Carbon

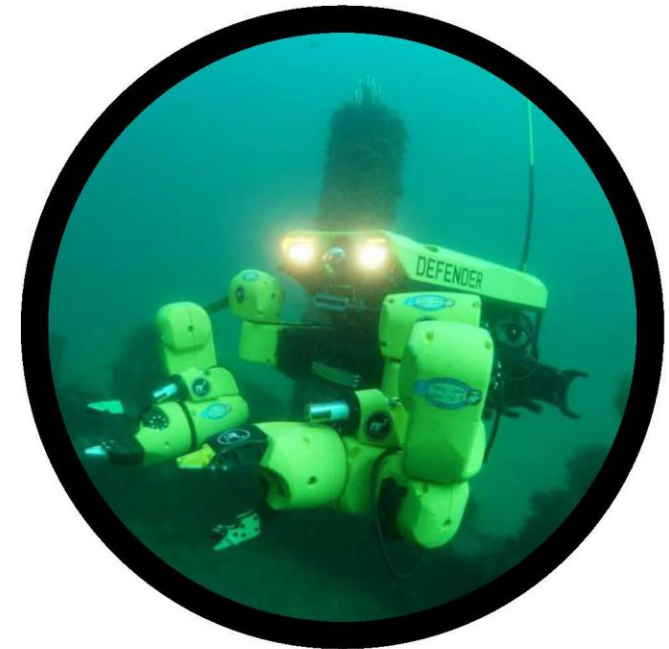Typical TRISO particle layer structure

CLOSING REFLECTIONS

A Knowledge Industry that succeeds through an Enterprise Approach

- 'thank you' and 'well done' !

- Celebrate progress made

- Future RD&E / S&T (24/25 Bids)

- Growing Our Next Gen S&T / Industrial Base. Investing for the future via the Defence and Security Industrial Strategy (DSIS), Integrated Procurement Model, Sector Strategies (eg Defence Torpedo Industrial Strategy), and Category Strategies through DE&S, plus Gateway reform.

- Funding Cycles ! **2024/5 is THE key year in 'making the case.'**

- Expect a series of RFIs (SSTD, Autonomy (M-USV), LRAW, and Modular Sensor Solutions (MCM, Military Data Gathering, ASW, Seabed Warfare). We welcome 'end to end' ideas and non-committal ROM. An 'Open book' on Trials data and TRL is key!

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QUESTIONS & DISCUSSION