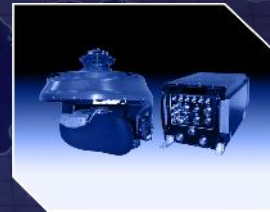
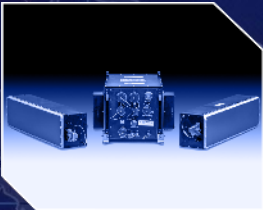


Multi-Domain Maritime-Environment Awareness

Fixed Wing Maritime Patrol Aircraft

Combined Naval Event

Date: 24 May 2023



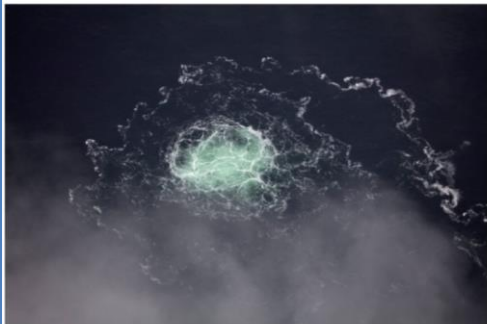
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 **GENERAL ATOMICS**
AERONAUTICAL

Increasing Need for Multi-Domain Maritime Surveillance

Nord Stream gas 'sabotage': who's being blamed and why?

By Joanna Plucinska



A gas leak from Nord stream 2 is seen in the Swedish economic zone in the Baltic Sea in this picture taken from the Swedish Coast Guard aircraft on September 28, 2022. Swedish Coast Guard/Handout via TT News Agency/via REUTERS

Norway watches warily as Russian subs and aircraft step up Arctic patrols

The NATO ally has released videos exclusively to NBC News illustrating what it sees as a growing Russian threat near a maze of undersea pipelines.



PHOTO: UK's Type 23 frigate tracks Russian warships in English Channel

VESSELS

March 14, 2023, by Fatima Bahtio

Royal Navy's Type 23 frigate HMS Portland has deployed from Plymouth to track Russian Gorshkov-class guided missile frigate, Admiral Kasatnov, and support tanker, Akademik Pashin.



RAF Typhoon jets intercept Russian military aircraft north of Scotland. (©RAF)

RAF Typhoon fighter jets scrambled to intercept Russian spy plane lurking near UK

Typhoon jets as well as a Norwegian F-35A fighter aircraft were also launched as part of NATO's response to the Russian aircraft - a Tu-142 Maritime Patrol aircraft - which was spotted in international airspace north of Scotland

Russian submarine that could attack pipelines 'tracked near Shetlands'

f

Jimmy Nsubuga

2 November 2022 · 3-min read

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In this article:



Ukraine war

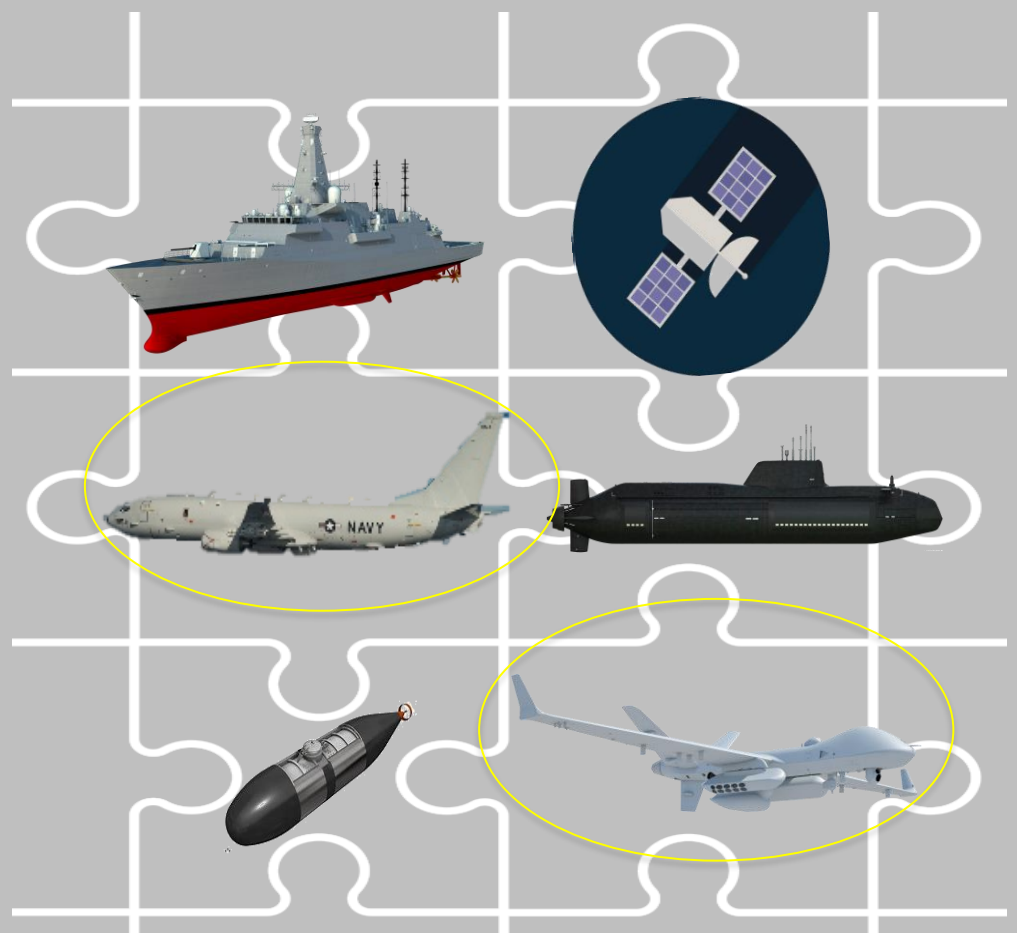


Vladimir Putin
President of Russia...



The Russian submarine was tracked near the Shetland Islands in Scotland where a cable lost power. (Getty)

Jigsaw Puzzle of Platforms Required to Perform a Myriad of Missions (not all platforms or missions included)



**ASW/
ASuW**

**Amphib
Ops**

**Illegal HA/DR
Immigration**

**EEZ
Monitoring**

SAR

AEWC

Smuggling


**Infra
Monitoring**

There is NO Single Platform that is 'One Size Fits All', but Teamwork and Interoperability Wins the Day

Platform Focus: Manned Maritime Patrol Aircraft (MPA)

**\$6B USD for
System
Design &
Development**



	4 Years (2000-2004) Solicitation to Contract with Boeing	9 Years (2004-2013) USN IOC	USN, India, Australia, UK, Norway, Germany, ROK, etc.
	prep time	cook time	serves
INGREDIENTS			
Legacy P-3C			
Commercial 737-80 NG			
\$6B for System Design & Development			
1000's of Requirements			
State of the Art Sensors			
Sonobuoys and Weapons			
Milestone C			
LRIP / FRP			
DIRECTIONS			
Identify legacy capabilities needed for 'new' Multi-Mission Aircraft			
Pick a commercial airframe that is cost efficient and low maintenance			
Build 4 flying and 2 non-flying test articles			
Utilize 1000's of NAVAIR and Boeing Engineers			
Fully integrate sensors with airplane and Mission System			
Fully integrate the carriage of sonobuoys and weapons			
Pass the EDD/SDD phase before heading into LRIP or FRP			
Build airplanes			



The P-8A Poseidon is the MOST capable fixed wing manned MPA

Today's Modern Maritime Patrol Aircraft (Manned and Unmanned)



MQ-9B
SkyGuardian | SeaGuardian | STOL

CAPABLE & READY FOR CONTESTED OPERATIONS
Anytime | Anywhere



Manned MPA	Capabilities	MQ-9B SeaGuardian
Yes, 240°	Maritime Patrol Radar (SAR, ISAR, Periscope Modes)	Yes, 360°
Yes	EO/IR (HD/1080/LD/LRF)	WESCAM MX-20
Yes	ESM/ELINT	Yes
No	COMINT	Yes
Yes	AIS	Yes
No	Wide Band SATCOM	Yes
Yes	Link-16	Yes
84-126	Sonobuoys (Capacity)	40 'A' or 80 'G'
Yes	Weapons	Yes
10+ hours	Persistence	25+ hours

SeaGuardian Provides Stand-Alone and/or Complementary Capability

Platform Focus: Fixed Wing Unmanned MPA



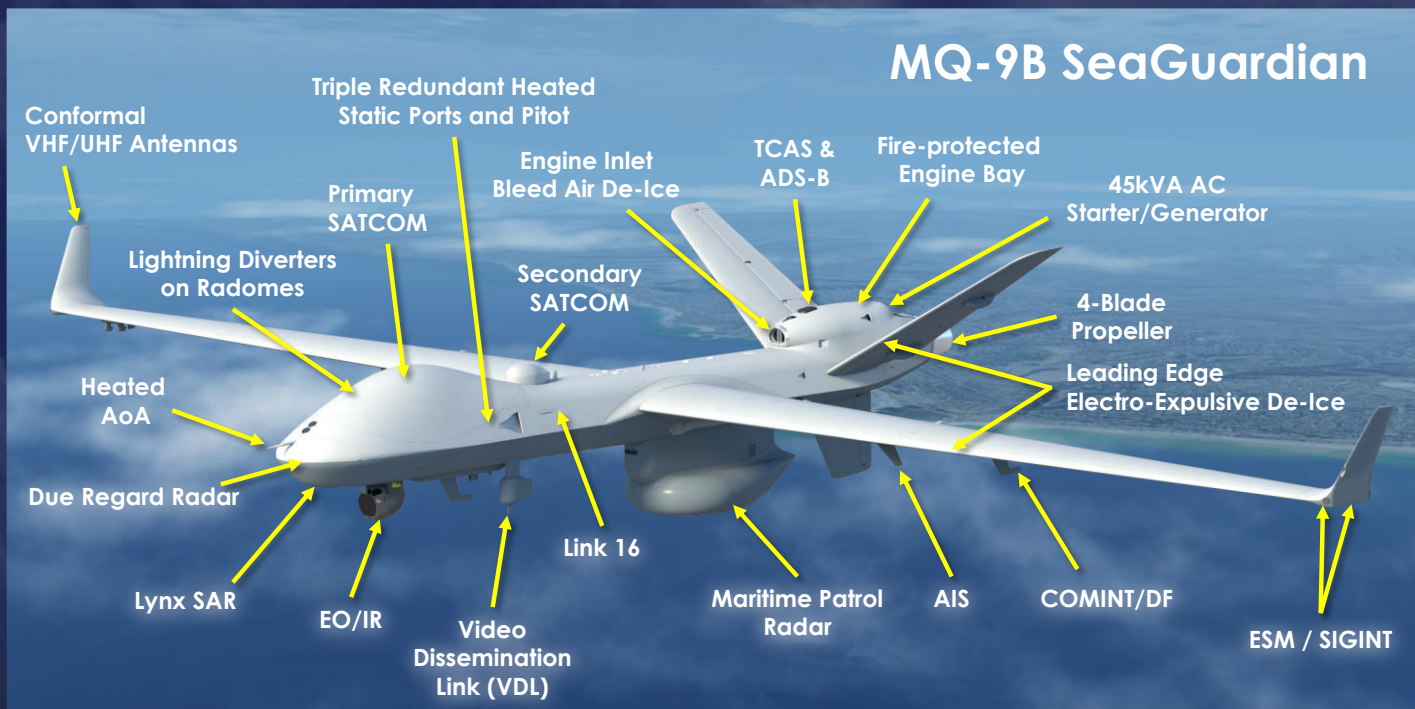
MQ-9A Reaper



MQ-9B UK Protector



MQ-9B SeaGuardian



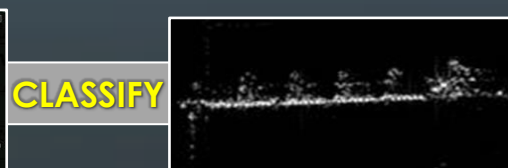
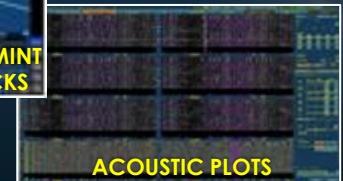
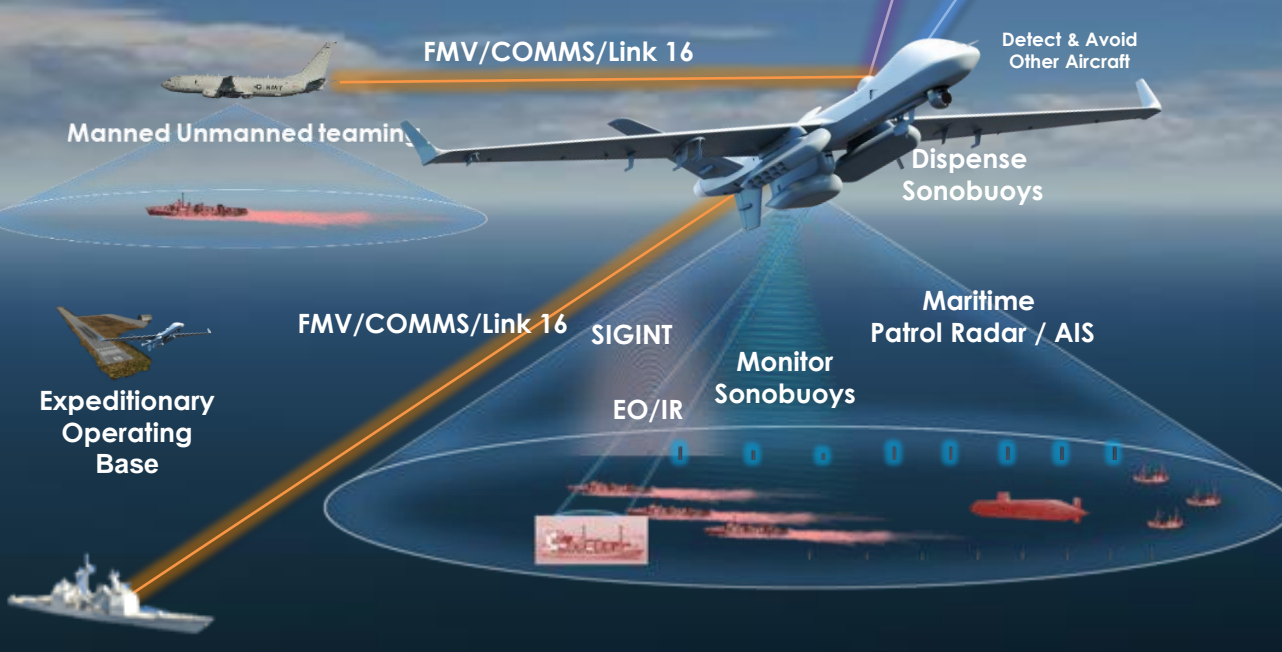
The MQ-9B SeaGuardian is the **ONLY** Capable Fixed Wing Unmanned MPA

Mission Focus: ASW

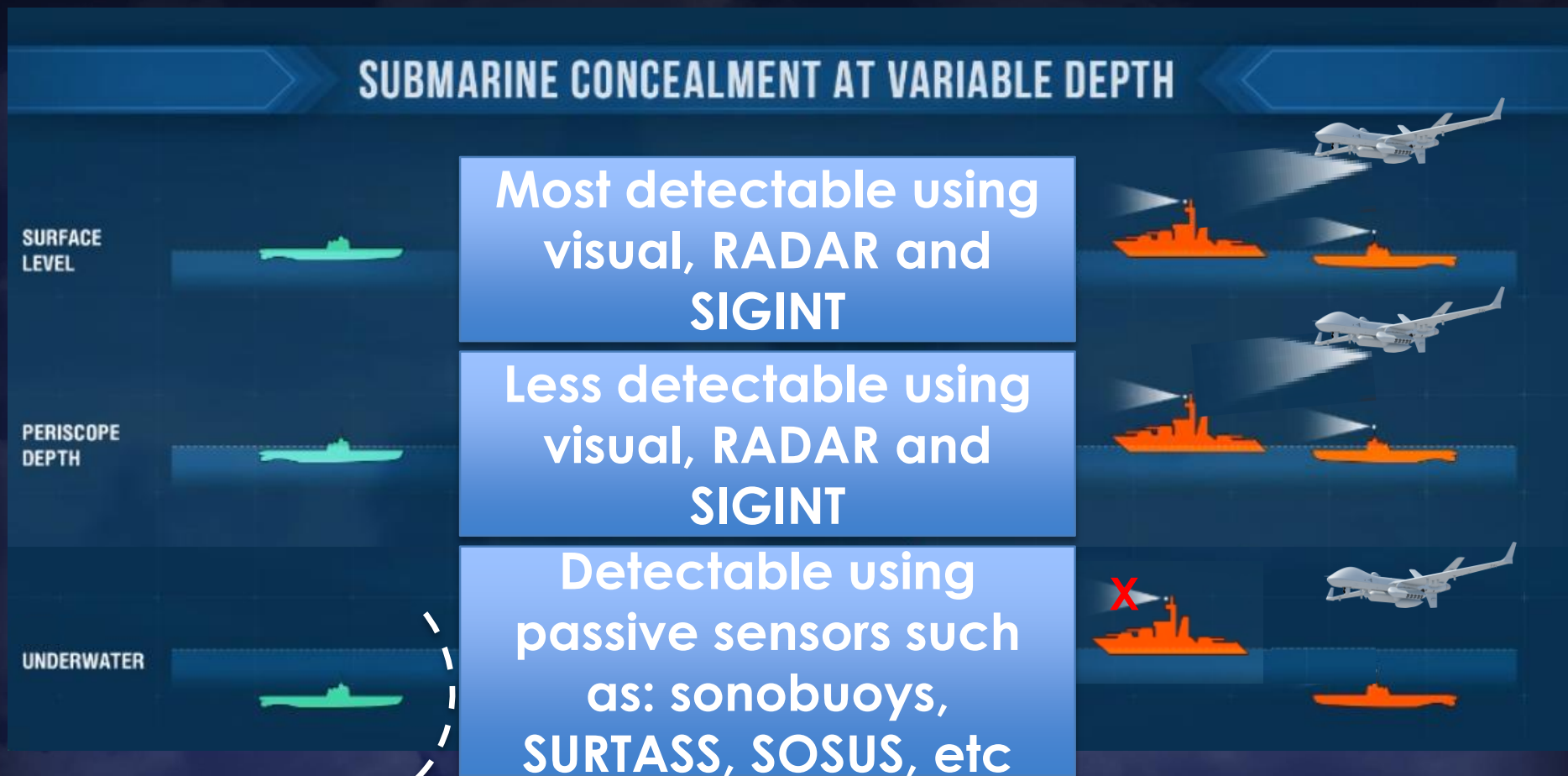


OV-1 MQ-9B SeaGuardian

ASW/ASuW/Manned-Unmanned Teaming (MUM-T)



ASW is a Team Sport across Multiple Domains

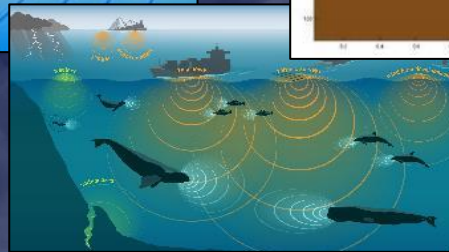
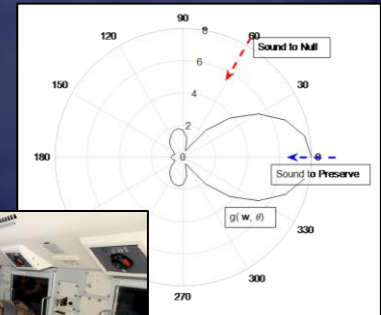
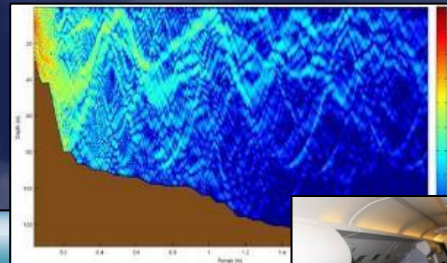


Majority of Submarines Detected when on the Surface or at Periscope Depth...
They Know it and Avoid it

Finding the Submarine with Passive Sensors Old School Equation

The SONAR Equation hasn't changed:

$$SE = SL - AN - PL - RD + DI$$



The sonar equation is missing an entire dimension: **TIME**

TIME = PERSISTENCE

Invest in Persistence and MUM-T to Win ASW

Mission Focus: Airborne Early Warning & Control (UAEW&C)

Full AEW&C, including IFF & BMC2

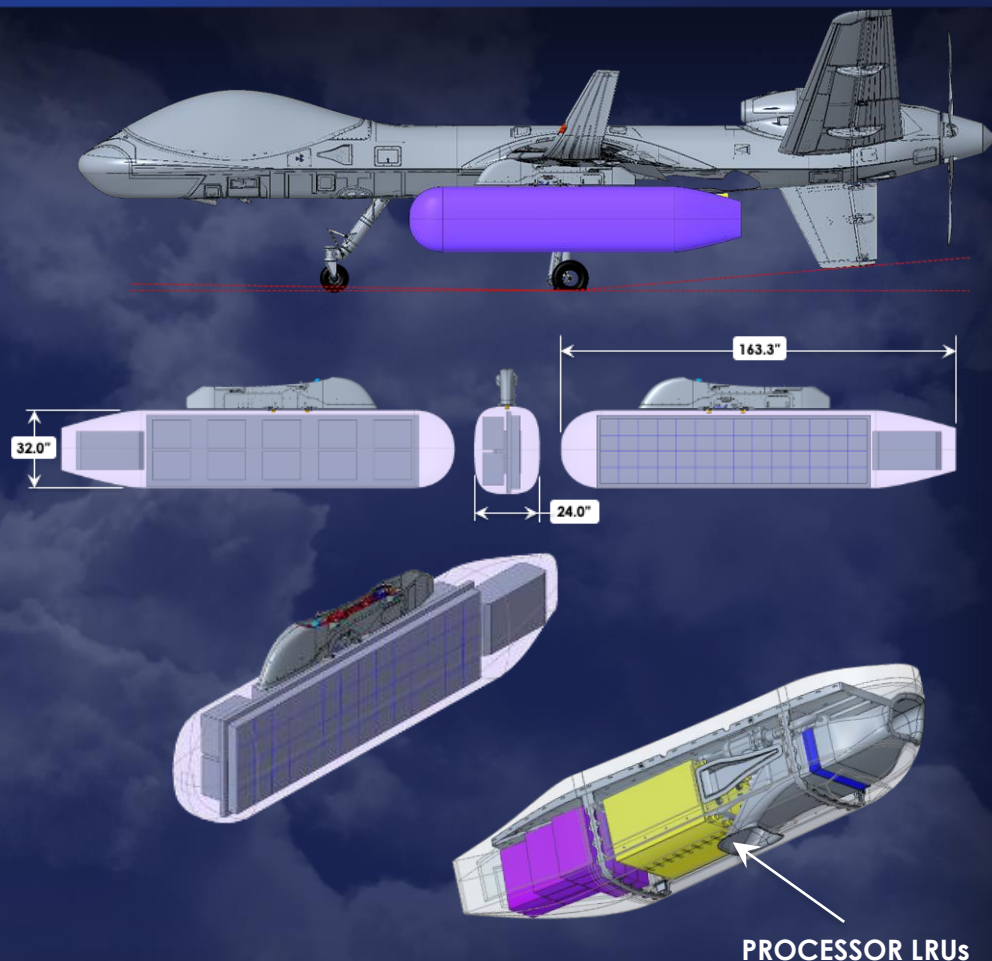
- Dual-pod solution - one aperture pod on each wing

Wide area air surveillance mode

- Dual sided scans with detection range that is Target RCS dependent

Extended Range Early Warning

- Sector scan with an increased detection range that is Target RCS dependent



2035 NATO AWACS Replacement Initiative Alliance Future Surveillance and Control (AFSC)

MQ-9B Ship-Based Organic Capability Short Takeoff and Landing (STOL)

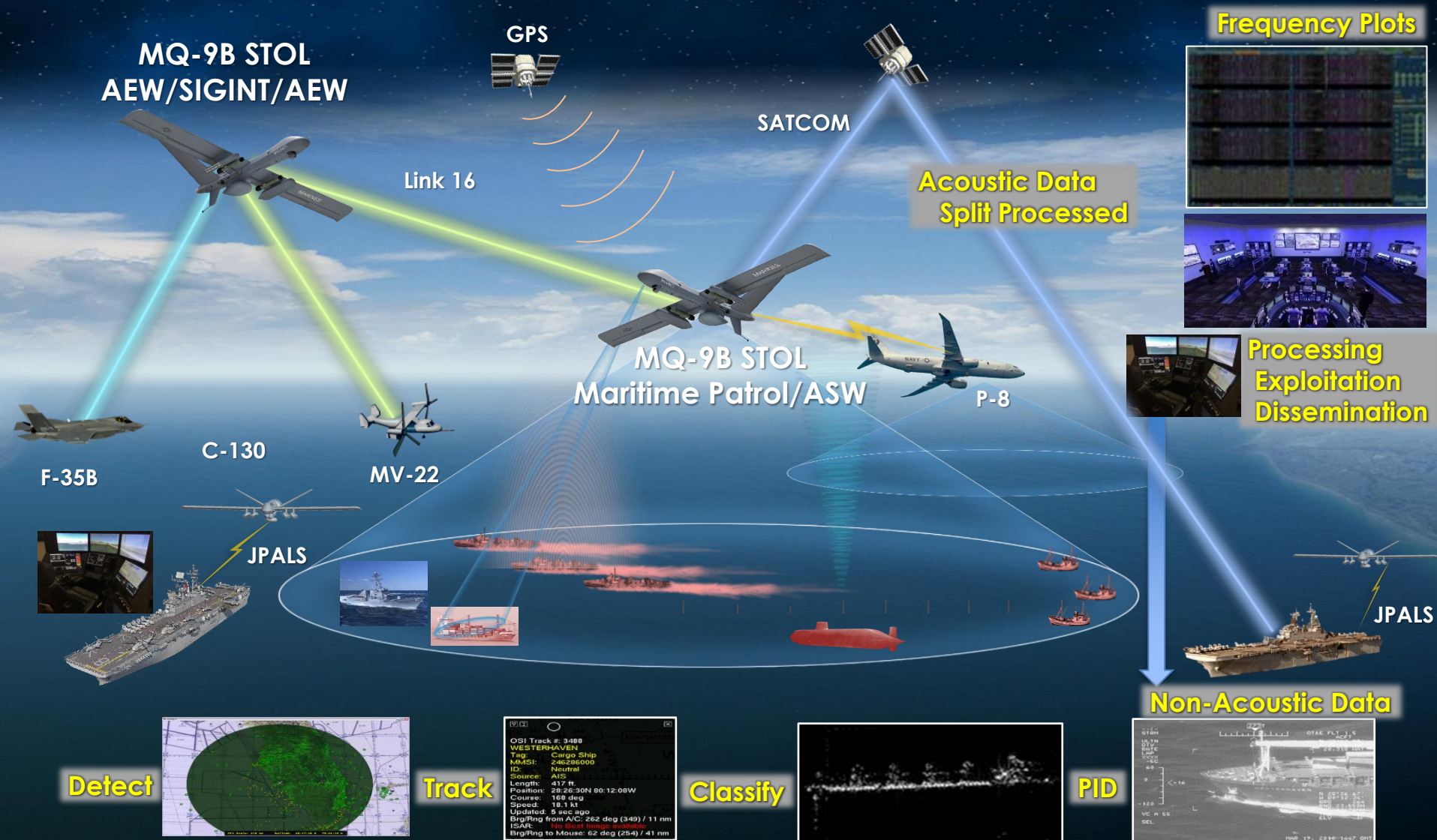


- Why: Strong multi-national requirement for a ship-based, long endurance, long range AEW/ASW/ISR capability
- What: Flat deck capable MPA + AEW
 - Catapult/arresting gear not required!
- How: MQ-9B SeaGuardian + STOL Kit



OV-1 MQ-9B STOL

Ship-Based Operations



MQ-9B SeaGuardian STOL

Ability to use existing small airfields (other hard surfaces) reduces dependence on a handful of targetable, large fixed facilities

Customer Problem Sets

- Runway availability and vulnerability; first targets in conflict
- Lack of ship-based long endurance, long range, organic ISR/AEW/ASW
- Insufficient aircraft quantities and/or aging platforms
- Challenging defense budgets and need for cost-effective ISR



MQ-9B
SeaGuardian



Land-based
MQ-9B STOL Kit

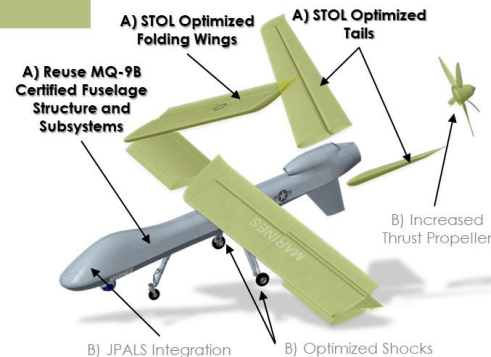


Ship-operable
MQ-9B STOL

STOL kit is a cost-effective solution for existing/prospective MQ-9B customers

Two-step path for MQ-9B STOL:

- Land-based STOL** – shore-based; field (re)configurable in 1 day
- Ship-operable STOL** – shore-based with periodic landings and/or takeoffs afloat
 - Conditionally-marinated



Proposed UK Royal Navy Tech Demo (November 2023)

- Single flight off Queen Elizabeth class carrier
- Uses Mojave as STOL tech demonstrator



Multiple International and US customers have Missions and Requirements for Medium Altitude Long Endurance (MALE) UAS STOL

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 **GENERAL ATOMICS**
AERONAUTICAL

Questions?

A paradigm shift is a major change in how people think and get things done that upends and replaces a prior paradigm.

What is your paradigm regarding unmanned systems?

