

*ASPRS-Florida Region Annual Conference  
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**MARITIME APPLICATIONS OF UAS REMOTE SENSING FOR  
COST-EFFECTIVE IMPROVEMENTS IN DETECTION AND  
MONITORING OF ILLICIT TRAFFICKING IN MESOAMERICAN  
TERRITORIAL WATERS IMPLEMENTED THROUGH  
COMPREHENSIVE ENGAGEMENT STRATEGY**

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**Topical Outline of Presentation**

1. Operational Capacity Shortfalls of Governments
2. Maritime Situational Awareness
  - Fully Submersible Vessel (FSV)
3. UAS-Deployed ISR Capacity-Building
4. Comprehensive Maritime Engagement Strategy
5. U.S. National Security Goals & Interests

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## Current Obstacles to Increasing Maritime Situational/Domain Awareness

- ***Low Response Capacity:*** Limited number of available ships and manned aircraft -- U.S. and partner nations for investigating anomalous activities in national territorial waters.
- ***Low D&M Capacity:*** Limited production of D&M intelligence produced from partner nations surveillance systems to match the requirements for maritime situational & domain awareness.

1. Operational Capacity Shortfalls of Governments

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## Mesoamerican Territorial Waters: Cocaine Smuggling

- 80% via Maritime Conveyance
- Caribbean & Pacific Waters of Mesoamerica Regional Corridor
  - ✓ Surface *go-fast* boats
  - ❖ Self-Propelled Semi-Submersible Vessel (SPSS)
  - Fully Submersible Vessel (FSV)
- Commercial transport: e.g., cargoes, trawler,
  - hull-attached parasitic device

2. Maritime Situational Awareness – Western Hemisphere

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## ***Go-fast Boats*** High Wake-Turbulence & Acoustic Signatures



2. Maritime Situational Awareness – Traditional Surface Craft

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## **Priority-Threat Platform: Self-Propelled Semisubmersible (SPSS)**

Aerial View



2. Maritime Situational Awareness – SPSS

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## Self-Propelled Semisubmersible (SPSS)

Sea Level View



2. Maritime Situational Awareness – SPSS

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## Priority-Threat Platform: Fully Submersible Vessel (FSV)

*Photo: Christoph Morlinghaus*



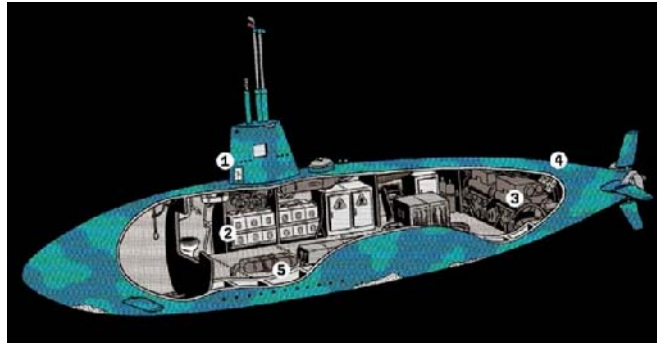
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## Fully Submersible Vessel (FSV)

(specifications key on next slide)

Illustration: Kristian Hammerstad



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## Fully Submersible Vessel (FSV): Specifications

Source: J. Popkin; from report by U.S. ONI Farragut Technical Analysis Center

- 1 - Conning Tower:** 5.5-foot structure with tiny windows, electro-optical periscope, and infrared camera operating while FSV remains submerged.
- 2 - Batteries:** 249 lead-acid batteries power two electric motors for submerged silent running (daylight) for up to 18 hours before recharging.
- 3 - Main Engines:** Surfaced running (nocturnal) on two four-cylinder diesel engines at speeds up to 8.5 knots/10 mph. Range 6,800 nautical miles—roughly one round-trip from Colombia to San Diego.
- 4 - Operating Characteristics:** *Maximum submerged depth - 62 feet.* Hull sheathed in Kevlar and carbon fiber instead of steel, making it hard to detect with sonar or radar.
- 5 - Buoyancy System:** Compressed air is used to blow seawater out of more than a dozen ballast tanks, increasing FSV buoyancy for surfacing. Dive valves opened to flood tanks for submerged operation.

2. Maritime Situational Awareness – FSV

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## **Notional ISR D&M Ensemble: Platforms & Sensor Types**

### **Platforms**

- UAS
- Aerostat/airship
- Shore-affixed installations (e.g., VTS/Operations Center)
- UUV/USV

### **Sensor Types**

- Bathymetric LIDAR (20-30m depth)
- Radar
- FLIR
- Hyperspectral
- Acoustic

3. UAS-Deployed ISR Capacity-Building

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## **UAS Technical Architecture**

- Platforms
- Shore-affixed installations
- Sensor Types
- Maritime Situational Awareness

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**Data Fusion/Integration for D&M Targeting:  
UAS Technical Issues**

- Timely Accurate Cueing
- Search Endurance
- Sensor Payload Effectiveness

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**Data Fusion/Integration for D&M Targeting:  
UAS-Maritime Operations Center Coordination**

- GIS Ingestion of Sensor Inputs to Vessel Tracking System
- Fusion & Analysis of Anomalous Vessel Activities
- Actionable Tasking to Response Assets

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## **Data Fusion/Integration for D&M Targeting: UAS Support to Interdiction Resources**

- D&M ISR Fusion Support to LEA-embarked Patrol Boat
- Tactical-feed Directing Patrol Boat to Intercept/Apprehension Endgame

3. UAS-Deployed ISR Capacity-Building

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## **UAS: A Cost-Effective Alternative For Partner Nations**

- PN High-Resolution Actionable D&M Information
- Small UAS for Quantum Improvements in Cost-effective Maritime Situational Awareness
- Capacity Building through effective use of these capabilities
- Increased Interdiction in PN Territorial Waters
- Greater data sharing with U.S. and Regional partners

3. UAS-Deployed ISR Capacity-Building

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## **Comprehensive Maritime Engagement Strategy (CMES)**

### **4-Phase International Engagement Model**

- *Establish positive governmental control*
- *Establish security regime*
- *Design/implement sustainable development plan*
- *Establish management regime*

4. Comprehensive Maritime Engagement Strategy

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## **CMES: Integrating Strategy & Exploiting Technology**

### **Lines of Effort & Direct Outcomes**

*> phased or simultaneous <*

- (1) Governance controls in maritime jurisdictions.
- (2) Security of ports, waterways, & related supply chains.
- (3) Capacity-building of the maritime trade sector.
- (4) Processes for sustained government-industry management of:  
(a.) maritime region & (b.) maritime domain.

4. Comprehensive Maritime Engagement Strategy

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**CMES Desired Outcomes Example:  
*Governance Controls***

**Operational Objective**

- Increased PN Maritime Situational Awareness
- Improved PN Targeting of D&M Events
- Higher Success Rates in Interdiction Response

**Strategic Objective**

- Effective Management & Economic Development of national & regional Maritime Domains

4. Comprehensive Maritime Engagement Strategy

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**U.S. National Security Interests:  
PN Capacity-Building Assistance in D&M**

- 1. DoD D&M assets can be expected to decline.
- 2. Partner nation collaboration is fundamental.
- 3. U.S. & PNs benefit from secure & effective/efficient trade lanes.
- 4. Engagement with PNs is wholly consistent with U.S. security strategies.

5. U.S. National Security Goals & Interests

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## The End

- Questions?
- Comments?
- Discussion?

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- ❖ Niesen, Bradley J. and Thomas D. Morelli, 2012. *Maritime ISR Data Fusion/Integration for Cost-Effective Improvements in Detection and Monitoring of Illicit Trafficking In Mesoamerican Territorial Waters Implemented Through Comprehensive Engagement Strategy*. ASPRS/MAPPS Fall Conference Proceedings, Tampa, October 29 – November 1.
- Popkin, Jim, 2011. Authorities in Awe of Drug Runners' Jungle-Built, Kevlar-Coated Supersubs; March 29. [http://www.wired.com/magazine/2011/03/ff\\_drugsub/all/1](http://www.wired.com/magazine/2011/03/ff_drugsub/all/1)

## **Maritime Regional Analysis: A New Geography**

- Land/Sea Use: A Single Geospatial Unit
  - Integral National Region
  - Demarcation by Political Boundaries
  - UNCLOS Defines the Offshore Regional Boundaries
- Maritime Region Delineated:
  - Spatial & Functional Relationships
  - Discriminated from Maritime Domain
  - GIS Goes to Sea
- Knowledge & Understanding Provides Governments:
  - Information Confidence & Decision Advantage

Maritime Regional Analysis: A New Geography

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