Global Maritime Awareness

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# Global Maritime Awareness

**Perfoming Organization Name(s) and Address(es):**
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**Abstract:**

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- b. Abstract: unclassified
- c. This Page: unclassified

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Same as Report (SAR)

**18. Number of Pages:**
39
National Office of Global Maritime Situational Awareness

A multi-departmental/agency NATIONAL office responsible for effective access to maritime information and data critical to building situational awareness.

Mission: Act as a Maritime Awareness Coordinator “Honest Broker”

We are responsible for:

- Increasing communication and building trust
- Performing international and domestic outreach
- Making maritime information available/shareable

Forging relationships, enabling technology, effecting policy
The National strategy for Maritime Security has mandated an even higher level of interagency cooperation in pursuit of effective MDA.

A Cooperative Strategy for 21st Century Seapower

A comprehensive national effort to promote global economic stability and maritime safety and security.
Desired Outcome

Vision: Global maritime information exchange to improve decision making
The information is there...
Information sharing is difficult………..

Recent GAO Report

Agencies are using **56** different sensitive but unclassified designations (**16** of which belong to one agency) to protect information.

“*Office cubicles, the beltway, the budget, and stovepipes.*”

“The light was blinking red”. *911 Commission Report*
Situational Awareness + Sense Making = Maritime Domain Awareness
Office of Global Maritime Situational Awareness

Initiatives:

1. Information Hubs
2. MSSIS (Maritime Safety & Security Information Systems) - Expansion
3. GMISS (Global Maritime Information Sharing Symposium)
4. TEXAS 3 (TEchnical eXchange on Ais via Satellite)
5. C-SIGMA (Global Maritime Awareness from Space)
Increasing & Coordinating Data Sharing

... coordinate information flow for subject areas domestically and internationally and facilitate information and data sharing.*

* US National Concept of Operations for Maritime Domain Awareness
What are Hubs? Information Enterprise Hubs are the lead coordinators and subject matter experts for their specific areas of MDA information.*
*Cargo, vessel, people, infrastructure

Why develop Hubs? The hubs support information sharing efforts to bridge the gap until policies, relationships and technology are in place

“They are not systems, they are people.”
The Balance
### Active Participants

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<tr>
<th>Albania</th>
<th>Finland</th>
<th>Italy</th>
<th>Portugal</th>
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<td>Australia</td>
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<td>Bahrain</td>
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<td>Sao Tome &amp; Principe</td>
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<td>Estonia</td>
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<td><strong>Total Active Participants:</strong> 56</td>
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### Pending and / or Under Constructions

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<tr>
<th>Argentina</th>
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<td>Ecuador</td>
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<td><strong>Total Pending and Under Constructions:</strong> 53</td>
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GLOBAL PICTURE OF AIS RECEIVERS & MSSIS SOFTWARE
Way Ahead

- The National Maritime CONOPS has set up short term, mid term, and long term goals to improve transparency in the maritime domain.

  • **Short term (0-5 years):** “[I] **intensify the acquisition of data for small ocean-going craft** (vessels < 300 tons) with an emphasis on the vessels of greatest concern regarding illegal maritime **activity**—**dhows and fishing vessels**”.

  • **Mid-term (6-10 years):** “Implement technologies which detect vessels as small as 65’ on the **open ocean**.”

  • **Long-term (11-20 years):** “reduce the size of the non-emitting objects that can be detected and monitored on the ocean towards the ultimate goal of 25 feet”.
The principal goals of the NMATS include:
- In coordination with the OGMSA and the GMAI I,

**Provide an effective methodology** for the federal leadership to identify, participate in, and influence the technology-related processes in the development of the nation’s maritime security.

DODTECHI PEDIA - Effective Tool to assist Goals!
Basic objectives are:

1. Assist all users to understand MDA capabilities
   - Fielded
   - Under Acquisition
   - Under Development (6.1 to 6.5)

2. It will include:
   - Systems
   - Sub-systems
   - Enabling Technologies

3. Enable developers to identify sources of capabilities

4. Enable government R&D and acquisition managers to identify sources

5. Enable sub-systems/Technology developers to advertise their capabilities (data base becomes an MDA Toolbox)

6. Provide the potential for fielding capabilities more rapidly for both government and non-government.
# NMATS Data Base (Planned)

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<tbody>
<tr>
<td><strong>1. Collection</strong></td>
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<td>a. Sensors</td>
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<td>b. Platforms</td>
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<td><strong>2. Processing</strong></td>
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<td><strong>3. Fusion</strong></td>
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<td><strong>4. Analysis</strong></td>
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<td><strong>5. Display/Decision Aids</strong></td>
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<td><strong>6. Dissemination</strong></td>
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<td><strong>7. SMEs/POCs</strong></td>
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<tr>
<td></td>
<td>a. System</td>
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<td>b. Attribute</td>
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GLOBAL SPACE PARTNERSHIP

GSP

Collaboration in Space for International Global Maritime Awareness

C-SIGMA

Photo Courtesy of MDA

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Accordingly, the prospect of open ocean situational awareness from space via a global space partnership could fill the gap as mandated by the CONOP.
Commercially available, existing technology, and open source information from satellites.

The concept: An International Collaboration of 4 Types of Satellites:

1. Synthetic Aperture Radar Satellite--SARSAT
2. Electro Optical/Infra-Red—EO/IR
3. Automatic Identification System—AIS
4. Transponders—equivalent to IFF
C-SIGMA Concept

- **Use today’s commercial satellite technology**
  - Inexpensive
  - Readily available
  - Worldwide coverage
  - Choice of optical and radar sensors
- **Automate all processing**
  - Get results fast
  - Keep it simple and easy-to-use
  - Minimize manpower and user intervention
- **Be able to monitor large ocean areas**
  - Increase areas of surveillance
- **Be able to re-survey areas quickly**
  - Increase revisit times
  - Speed of re-surveillance
- **Accurately detect ships**
  - Minimize false hits
  - Increase ship detection probability
SARSATS

Space-Based SAR Provides Global Access

- All-Weather, Day-Night, Dynamically-Tasked, Tactical-Resolution SAR
  - Optimized for large area collections
  - Cues higher-resolution systems - Tipping & Cueing
- Augments NTM
- Repeat Orbit
  - Nominal 24 Hour Repeat
  - Optimal CCD over wide area
  - Maritime Domain Awareness
  - Non-SAR Mode for Vessel Detection
  - SAR mode for wake detection
- Simultaneous SAR Imaging & Tagging
- TPED using existing ISR Infrastructure
  - Theater tasking/downlink
  - Automated CCD Processing (projected capability)

Analysis of Change Indicates Potential Activities of Interest

Courtesy Ball Aerospace
L-Band SARSat

Wake and Ship Detection

Courtesy of Ball Aerospace
Cosmos Sky Med

Technology
- Constellation of four X-band SAR imaging satellites with multi-polarization

The So What
- Resolutions from sub-meter in spotlight mode through several tens of meters
- Rapid revisit, improved persistence, 24-hr, global coverage
- The only commercial imagery satellite constellation with this capability
- Dual-use system for defense and civil applications
Optical Systems

High Res Optical Satellites: e.g. EROS-A1, EROS-B, OrbView, QuickBird, WorldView, IKONOS, Spot Image, GEOEYE

- Suitable for ship classification:
  - Coverage from 8km to 16.5km
  - Resolutions from 0.61m to 1.80m panchromatic

- Agile satellites that provide 12 hour to 2 day revisit times depending on number of satellites

- Some include direct tasking to support Tactical Surveillance applications
GEOEYE’s & its First Pictures
This 1-meter resolution image was collected November 20, 2008 by the IKONOS satellite. The image shows the SIRIUS Star, the Saudi-owned crude oil carrier hijacked by Somali pirates, anchored approximately 5 miles off the Somali coast.

(IKONOS is 10 years old....)
Freighter off-loading at Casablanca, Morocco

½ meter resolution photo of Collected on October 25, 2008 by GEOEYE

Photo courtesy of GEOEYE
3rd Part of the C-SIGMA Equation

AIS

CRUCIAL NEW COMPONENT

LETS YOU KNOW WHO THE GOOD GUYS ARE
IMO resolution/requirement set in 2004
- Required for: All int’l voyaging ships > 300 GRT
- All passenger ships
- Ships must report position every 2 - 10 seconds, depending on speed
- Can integrate with land-based AIS
- Global access
ORBCOMM Worldwide plot, 24 hours data, 15,073 vessels tracked
OrbComm Future Plans:
Full AIS Enabled Constellation

- Up to 25 AIS enabled satellites projected for constellation
  - Four planes (45 - 48.5 degrees) of six satellites each One polar satellite (current spare available for polar launch) 675 - 750 km altitude

- Advantages of multiple AIS satellite constellation
  - Increases probability of message reception
    - Multiple “views” of individual vessels
    - Minimizes effects of co-channel interference
  - Network redundancy minimizes risks
    - Redundant space and terrestrial assets
Transponder Systems

- IMARSAT
- ORBCOM
- Iridium
- Global Star
- Etc.

Often overlooked, not very sexy?
The Real Maritime IFF System?
AKA
Self Reporting Systems

- Tracking, (fishers +), trucks, status change,
- Formatted Message
- Can be programmed to report
  - On a time schedule (every hour, every 30 minutes, etc.)
  - By geographic limit (cross a boundary)
  - Upon event (door open, temperature out of limits, etc.)
  - Combination of rules (e.g. LRIT)
  - Upon demand from shore
Global Maritime Awareness

Collaboration is THE Silver Bullet
GLOBAL MARITIME INFORMATION SHARING SYMPOSIUM 2009
SEPTEMBER 15-18
NATIONAL DEFENSE UNIVERSITY
FORT LESLIE J. MCNAIR
WASHINGTON, D.C.

Bringing the maritime industry perspective into government maritime awareness policy

OFFICE OF GLOBAL MARITIME SITUATIONAL AWARENESS
Call for Presentations

TEchnical eXchange on Ais via Satellite
TEXAS 3

UNCLAS- Open to All
August 18-19
Washington, DC

SCI
August 20
NSSO
Chantilly, VA

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