Strategic Vision for Maritime Awareness

Energy

Building a Sustainable Maritime Ecosystem

Maritime Awareness

Detecting Illicit Maritime Activities
Why we formed ThayerMahan

20th

• Capital Intensive
• Large Capital Ships
• High Profile
• Centralized, Fixed
• Carriers/Battleships/Submarines
• Command and Control
• Manpower Intensive
• Intrusive
• Blue Water
• Energy Intensive

21st

• Highly Scalable
• Distributed, Digital, Connected Forces
• Low Profile
• Distributed, Agile
• UUVs/AUVs
• Constructive Autonomy
• Manpower Light
• Non-Intrusive
• Blue Water or Gray Zone
• Energy Independent
Coexisting in the maritime domain

Balance of Plant Maintenance

Environmental Monitoring

UAV Visual Inspections

FLIDAR

ROV Inspections

NARW Monitoring

Seabed and Cable Surveys

ThayerMahan Wind Farm Support
The role of autonomy

**At sea**
- Vessel/vehicle operation
- Missions
  - Environmental characterization
  - Vessel or other activity localization
  - *Target identification*
  - *Object recognition*

**Ashore**
- Data archiving
- Data integration
  - Presentation (COP)
  - Pattern of life development
  - Change detection
    - Environmental characterization
  - Data sharing
Coast Guard mission applicability

District 7 – Example

1. Marine Environmental Protection
2. Port and Coastal Security
3. Aids to Navigation
4. Search and Rescue
5. Living Marine Resources - Fisheries
6. Migrant Interdiction
7. Drug Interdiction
8. Other Law Enforcement – foreign fishing law enforcement

GOAL – Use Autonomous Systems to increase efficiency and effectiveness of deployable maritime assets

ThayerCat (2020)

SeaWatch

Outpost

24/7 Op Center Monitoring
Technology Portfolio

Persistent Surveillance Systems

Outpost  SeaWatch

Port Security and Seabed Systems

SeaScout  SeaVision
**Outpost mobile persistent acoustic sensor**

- Proven in government applications
- Energy harvesting 24/7 sustainable
- High gain and localization
- Autonomous detection
- Ships and mammals
- Acoustic pollution
- Endurance 90+ days
- Near real-time reporting
- No moorings – **eliminates NARW entanglement threat**
SeaWatch integrates unique, mission proven technologies into a single system designed to augment existing interdiction and safety capabilities

- At sea communications intercept/relay system
- Autonomous, long endurance vehicle building off common platform expertise
- HF/VHF spectrum with operator enabled frequency scanning
- Direction Finding (DF) and audio recordings provided in real-time
- Mission Sets: Law enforcement, counter drug/trafficking operations, security, site awareness, early indicator/warning threat assessment
SeaScout bottom survey system

Actively stabilized towfish, smart winch, communications suite, and synthetic aperture sonar payload

- Survey speed up to 8kts
- 4km²/hr Area Coverage Rate
- 3cm x 3cm Resolution @ 200m
- Bathymetry Vertical Accuracy 10cm
- Real-time beamforming, georeferencing, mosaicking, and digital terrain modeling
- Data collection rate of 30MB/sec
- Operated in depth or altitude modes and includes automated bottom avoidance capabilities
- Mission Sets: Mapping/navigation, environmental assessment, infrastructure assessment, security/seabed threat monitoring

Quality seabed Imaging provides transparency with government and fishing community
24/7 Maritime Domain Awareness
ThayerMahan services include the option of “raw” data collection and dissemination to analysis and visualization across multiple domains. Redundant connectivity, uninterruptable power, and cloud-based architecture ensures the customer retains access and awareness as required.
Emerging Tech - Hyperspectral Imaging

- Reflective sensing technique that uses reflected sun-light to illuminate and measure reflective & absorptive indices to generate spectral signatures (chemical “fingerprints”)
- Promising work in marine sea-life detection
- Utilization in combination with UAS provides real time, accurate, and unmanned solution

Detection of sharks via aerial spectral imaging using camera and processing program (Source: An Innovative Method for Obtaining High Detection Rates of Sharks on Ocean Beaches by Cardno)

UAS equipped with Hyperspectral Imager (Source: Headwall Inc)

Multispectral versus Hyperspectral Imaging (Source: Wikipedia)
How we *think* we fit in Navy/USCG strategy

Foundation for an asset-constrained strategy
And Now – The Rest of the Story!

PAUL HARVEY
And now...the rest of the story...
Mike – "Hey Rich, let's go Fishing!"
Rich – "Sounds Good!"

Mike – "Let's drop everything and go change the 100 year old paradigm about Maritime Strategy!"
Rich – "You mean like Alfred Thayer Mahan did a century ago? Oh Yeah!"

Barriers to Entry:
- Big Government
- Big Defense
- Big Primes
- Raise VC Funds
- Gov't Compliance
- Gov't Accounting
- Disrupt 100 years of Naval Thought
- Gain Rapid Tech acceptance
- Protect IP
- .......

Mike – "This shouldn't be too hard – right?"
Rich – "Oh yeah?"
Rejection on All Fronts!

ONR – "This thing will never work!"
US Patent Office – "We are rejecting your patent for OBVIOUSNESS!"
VC Funding – "The US Gov't is your primary market – forget it!"

✓ Two guys
✓ A Garage
✓ An Idea

2017

Gaining Traction!

Start up Funding Secured
Patents Approved
Test Demonstrations Successful
Scaling of Capabilities
Big Prime Acceptance and Partnering
SeaBed Systems Group - SeaScout

DCAA/DCMA Audits
Facilities Clearance
Building Staff

Rich – "Oh yeah!"

2018
And now you know the rest of the story!
The Big Takeaways

- The challenges and risks in today’s maritime environment cannot be solved in traditional ways using traditional technologies
- Maritime Domain Awareness must be addressed and maintained using automation, AI and connected/distributed low-cost systems
- Disruptive innovation must be fostered by collaboration by/between Industry, Finance, Academia, Science and government customers
- There is a place in the search for maritime solutions for small business and entrepreneurs – this path must be made easier and fostered at the highest levels of government
- Never before has maritime transparency been more essential to mitigating maritime risks.

- ThayerMahan is here to serve many Coast Guard missions by providing low-cost, autonomous, multi-sensor solutions. Let us be your extra eyes and ears in the oceans!

www.thayermahan.com