Relocating Vessels of Interest in Maritime Security Operations

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Maritime Domain Awareness and Counter Piracy, 26-29 October 2009, Ottawa, Canada
Relocating Vessels of Interest in Maritime Security Operations

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For the MORS Blue Water MDA WG
October 29, 2009
Outline

- Background of Op ALTAIR and CTF 150
- Reachback request
- Development of a VOI planning tool
- Lessons learned
- Current Situation
  - Further tool deployments
  - Further development inside a larger project
Background of Op ALTAIR

- CDN contribution to Op ENDURING FREEDOM
- Iroquois, Protecteur, and Calgary for Roto 4
- Cmdre Davidson in command of CTF 150 from Jun to Sep 2008
- Reachback request identified 2 requirements
Request for Reach Back

- Formal request copying chain of command with deadline for initial response
- Back and forth dialogue to clarify problems with its requirement and intent
- Focus shifted to two problems
  - Arranging limited assets over a large area to best achieve mission success and MDA
  - Looking for vessels that have fallen off the Recognized Maritime Picture (RMP)
- Back and forth continued during tool design by sending the documentation for comment before final product
VOIR Development
(VOI Reconnaissance Tool)

• Developed as a stand alone Matlab application
• Estimate the position of a vessel based on past known location and up to 3 likely courses
• Results plotted on a geographic map that includes locations/areas of interest
• Probabilities calculated and transferred to a “heat map” for better visualization
• Various statistics calculated
• Estimated helicopter search times
### VOIR Output

#### Results Based on Input Parameters (Outlined Areas)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>COA 1</th>
<th>COA 2</th>
<th>COA 3</th>
<th>Total</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calc. Area (nm²)</td>
<td>178.7</td>
<td>184.3</td>
<td>NaN</td>
<td>363.0</td>
<td>6850.0</td>
</tr>
<tr>
<td>Probability (%)</td>
<td>33.5</td>
<td>40.0</td>
<td>NaN</td>
<td>73.5</td>
<td>26.5</td>
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<tr>
<td>Search Effectiveness</td>
<td>18.7</td>
<td>21.7</td>
<td>NaN</td>
<td>20.2</td>
<td>0.4</td>
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<tr>
<td>Search Area (nm²)</td>
<td>176.0</td>
<td>184.0</td>
<td>NaN</td>
<td>360.0</td>
<td>NaN</td>
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<tr>
<td>Expected contacts</td>
<td>9-18</td>
<td>9-18</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
<tr>
<td>Min. Search (hrs)</td>
<td>1.0</td>
<td>1.0</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
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<tr>
<td>Avg. Search (hrs)</td>
<td>1.5</td>
<td>1.5</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
<tr>
<td>Max. Search (hrs)</td>
<td>2.0</td>
<td>2.0</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
</tbody>
</table>

#### Results Based on Coloured Heat Map Areas of each COA

<table>
<thead>
<tr>
<th>Statistic</th>
<th>COA 1</th>
<th>COA 2</th>
<th>COA 3</th>
<th>Total</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calc. Area (nm²)</td>
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<td>8.2</td>
<td>NaN</td>
<td>7.7</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Observations and Lessons Learned

• An embedded scientist is a great asset
  – Need a liaison and a military champion within
  – Need ongoing dialogue

• Keep it simple during operations
  – Limited time
  – Avoid obstacles and delays

• Follow-on work must be managed
Positive Fleet Response

… But Also Room for Development …

• Overall excellent:
  – VOIR “could be of great use”
  – “There are several advantages to using” VOIR
    • Visualization with map and color codes
    • Automated rather than manual calculations
    • Uncertainty in VOI course taken into account
    • Variable VOI speed
  – “TFAS will continue to use this tool… during this deployment”
Current Situation

- Maritime Evaluation – formal tasking process
  - Ships performing Maritime Security Operations are to evaluate VOIR and provide feedback
- VOIR 1.11 developed for WINNIPEG deployment
  - Saving/loading scenarios, improved interface, User guide
- VOIR 1.11.3 developed for FREDERICTON deployment
  - Blue Force position added
- Development of VOIR to continue within an Applied Research Project which began in April
  - Land avoidance, previously searched areas, VOI waypoints, alternate situations
  - Covers from R&D right up to operational use
- ARP also aims to:
  - develop a tool for the placement of TG assets
  - continue work on the Recognized Maritime Picture
WBE 2: VOI Planning Tool

- Locate and observe a known VOI with avail resources
- Include
  - Data constraints, e.g. possible destinations vs start points
  - PIM track estimates
  - Land and boundaries
  - Variety of surveillance assets (ships, helos, MPAs, UAVs, satellites, fixed sensors)
  - Unsuccessful searches and negative information
  - Imperfect surveillance
  - Various VOI objectives
  - Need to operate covertly
- Coordinate Training package, SOPs, etc.
WBE 3: Planning Tools for MDA Resource Deployment

- Plan resource deployment that achieves best chance of mission success

- Capabilities
  - Handle combinations of mission objectives & tasks
  - Dynamic to allow for planned & unscheduled changes in fleet and other asset composition
  - Balance variety of resources & their employment restrictions
  - Propose changes when current deployment is compromised

- Manage actual plan
  - Generate tasking instructions
WBE 4: RMP Tools & Analysis

- Prototype RMP architecture and help direct the operational RMP architecture
- Further develop Prototype RMP Analysis Toolset (PRAT) & its operationalization into RAT
  - Develop or refine metrics and reports for the RMP
  - Use for TTCP AG8 analysis for Trident Warrior 09
- Analysis
  - New analyses to support clients
  - Recurring analysis from existing tools
  - Consultation to other C4ISR projects
Summary

• Delivered a VOI Reconnaissance (VOIR) Tool to CTF 150

• Started a new Applied Research Project to:
  – Continue work on VOIR;
  – Develop an asset deployment tool; and
  – Continue work on RMP architecture and RMP Analysis Toolset

• Looking for partners with common interests in each of these three areas
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