



Recognized Maritime Picture Tools and Analysis

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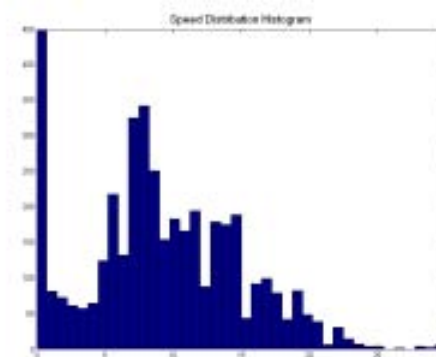
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Outline

- Improving the RMP
 - Data accuracy/completeness
 - Data archiving
- Metrics and Analysis
 - Identification
 - Tracking
 - Source contribution
- Operational Support
 - Reports
 - Alerts
- Conclusion



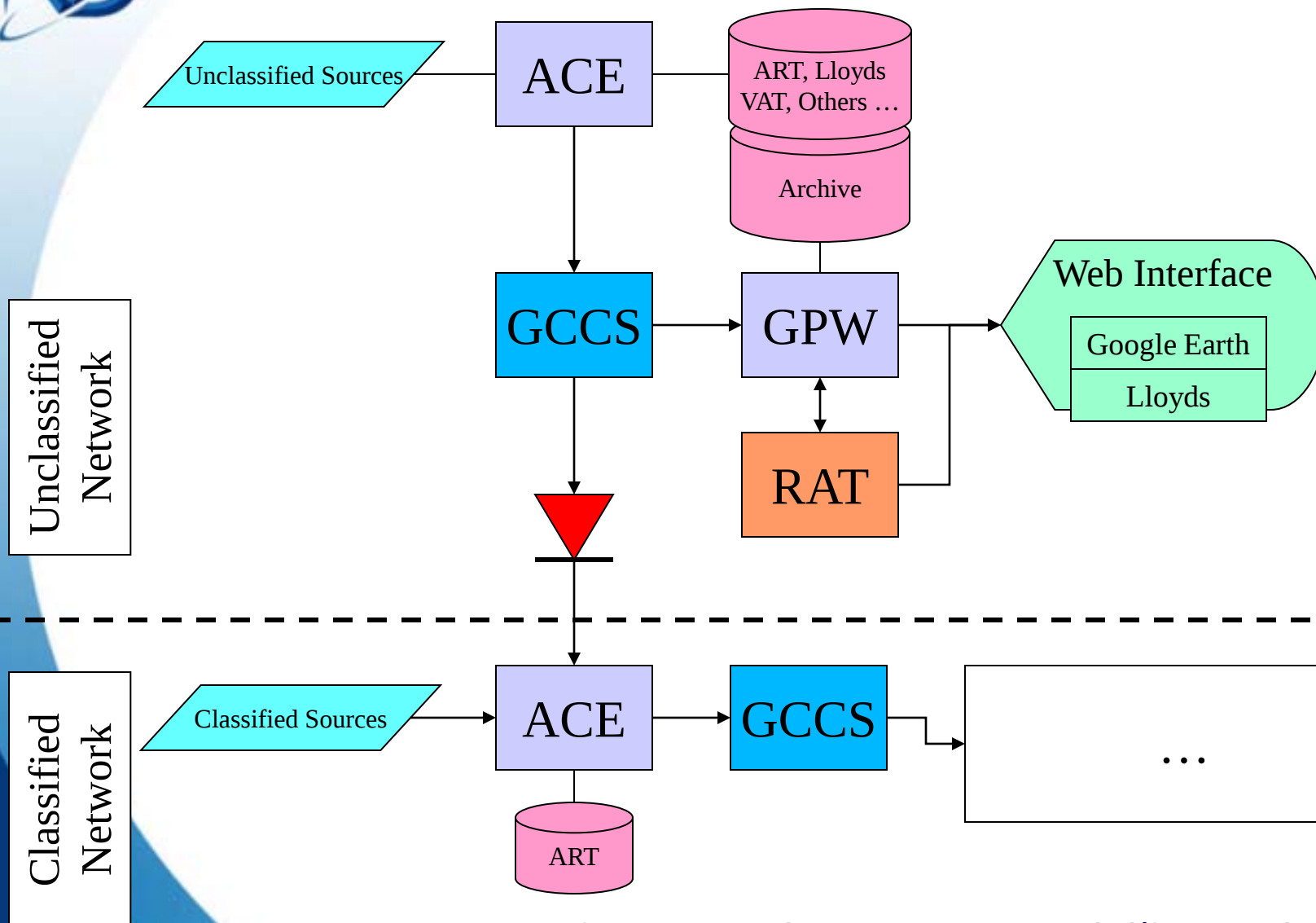


Improving the RMP

- DRDC CORA project “Maritime Security Planning Tools and Analysis”
 - RMP tools and analysis component
- New capabilities
 - Attribute Correction Engine (ACE)
 - Global Position Warehouse (GPW)
 - RMP Analysis Toolset (RAT)
- Development by MARLANT N6



RMP Architecture

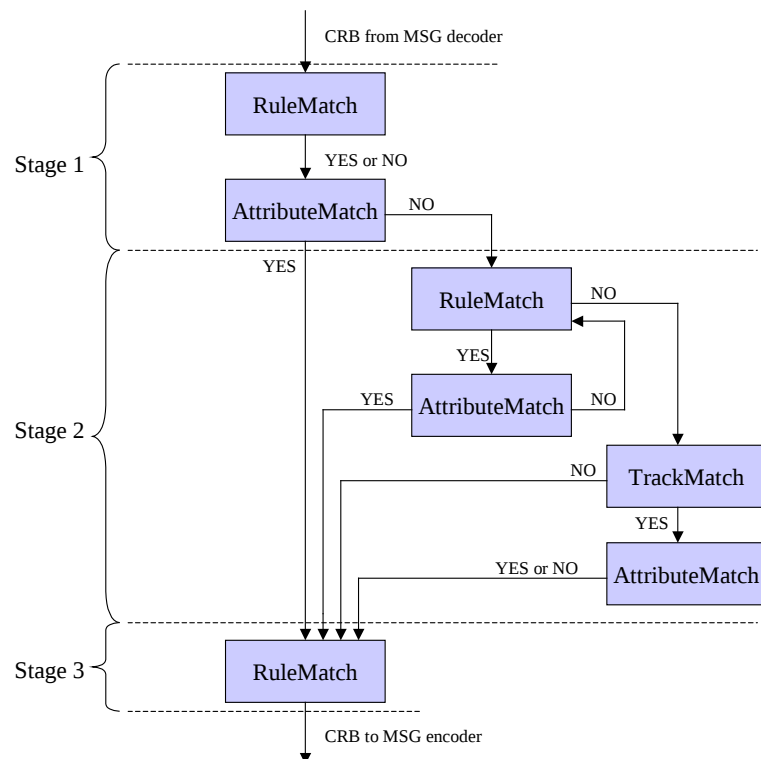


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Attribute Correction Engine (ACE)



- Fix errors in reports
- Fill-in missing pieces of information
- Apply rules to reports:
 - Data throttling
 - Fix common errors



Global Position Warehouse (GPW)

- Global Position Warehouse (GPW)
 - Archives reports post-ACE for historic analysis.
 - Filters tracks
 - Ability to sort tracks by common properties (category, location, flag, etc.)

Screenshots:



Global Position Warehouse (GPW) 2

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 **GPW Version 1.0.38**



[GPW Documentation](#)

☒ Search Name Load Search 

Search Track

Save Search

New Search

Search ICS

Logout

Track

Contact Report

Date/Position

Radar

Category vs Threat

ICS

Reports

Vessel Name

Flag

Vessel Type

Vessel Class

SCONUM

Hull

IRCS

UHD

IMO

MMSI

Licence



Query Active Tracks Only ☐ Display Contact Report Counts ☐

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RMP Analysis Toolset (RAT)

- Prototype version is currently being operationalized.
 - Collection of semi-automated and automated tools for analyzing the RMP
- Planned capabilities include:
 - Measures of performance/effect for detection, identification, and tracking.
 - Alerts
 - Generation of reports



Metrics and Analysis – PID

- Probability of Identification
 - Based on “eyes-on” observation.
 - Coverage from surveillance flights is used to estimate the effectiveness of surveillance.

$$P_{ID} = \begin{cases} \frac{T}{\tau/\eta} & T \leq \tau \\ 1 - (1 - \eta)^{T/\tau} & T > \tau \end{cases}$$

Horn, SA., Carson NL., Wind AF., (2009), A Metric for Maritime Intelligence, Surveillance, and Reconnaissance (ISR) – Probability of Identification, UNCLASSIFIED, DRDC CORA TM 2009-037

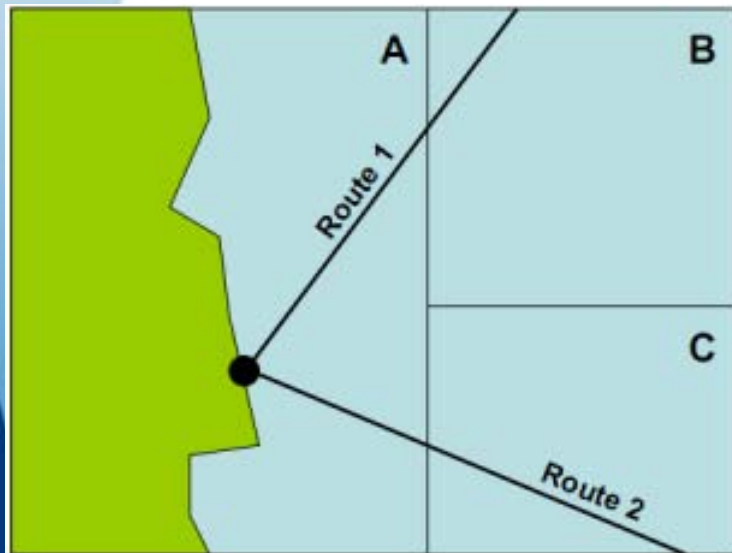
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Improving the RMP - **Metrics and Analysis** - Operational Support - Conclusion



Metrics and Analysis – PID 2

- Probability of Identification
- P_{ID} is calculated by zone & route and each zone is assigned an average P_{ID} .



$$P_{ID(Route\ Average)} = \frac{\sum_{i=1}^{N_R} P_{ID(Route:i)}}{N_R}$$

Horn, SA., Carson NL., Wind AF., (2009), A Metric for Maritime Intelligence, Surveillance, and Reconnaissance (ISR) – Probability of Identification, UNCLASSIFIED, DRDC CORA TM 2009-037

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Weekly Probability of ID (non-emitter)

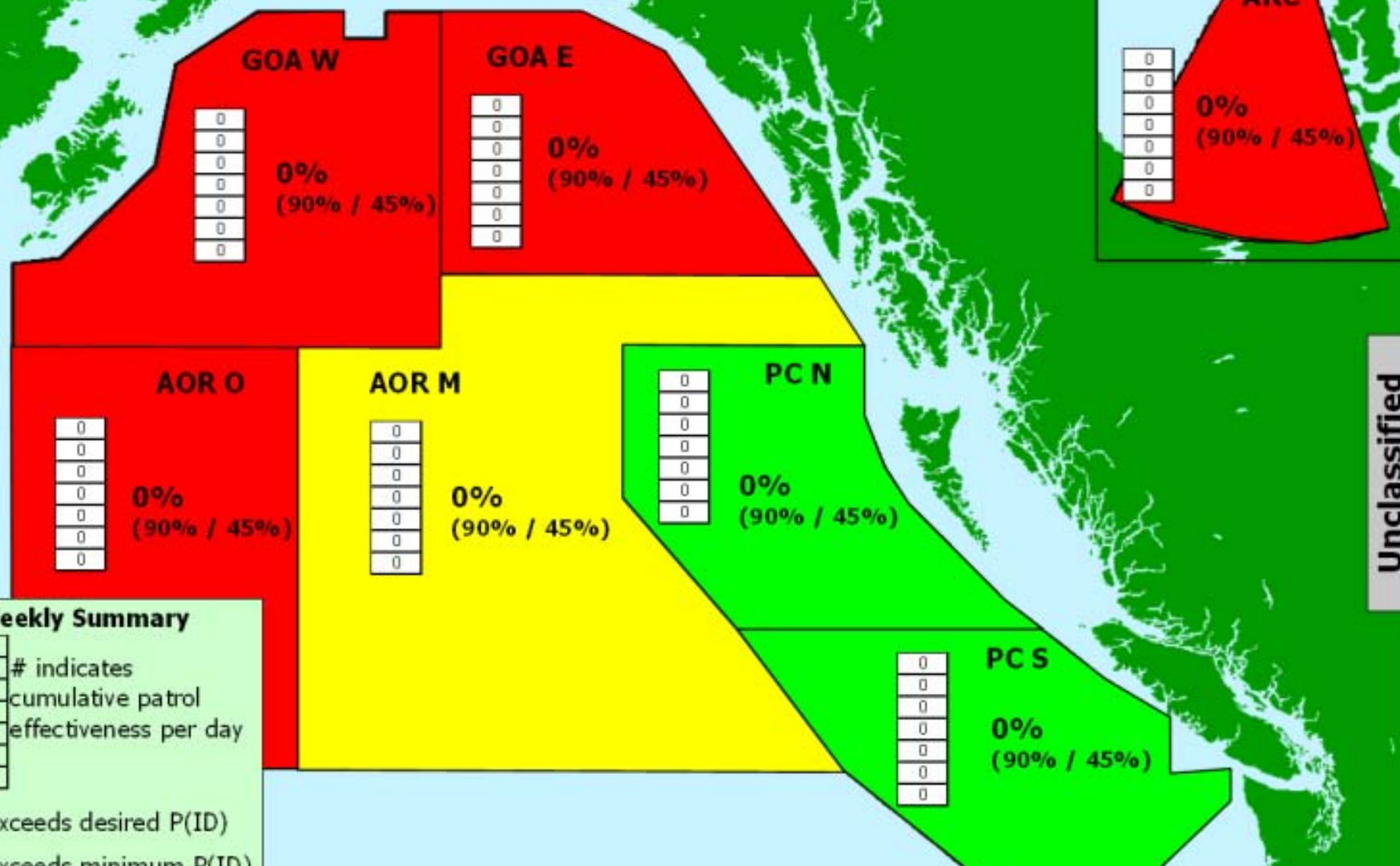
Incoming Threat @ 10 kts

23 Jun – 29 Jun 2008

Legend:

P(ID)

(Desired / Minimum)



Weekly Summary

Mon
Tue
Wed
Thu
Fri
Sat
Sun

indicates cumulative patrol effectiveness per day

- Exceeds desired P(ID)
- Exceeds minimum P(ID)
- Below minimum P(ID)

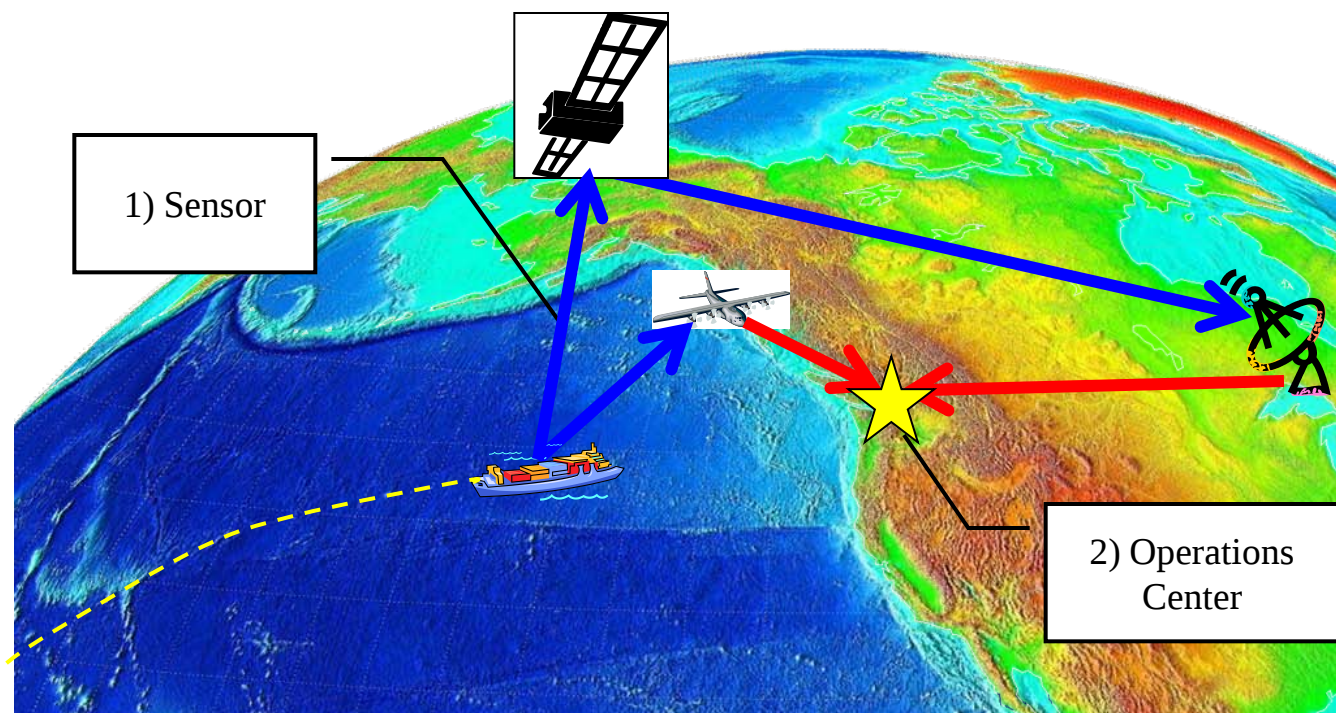
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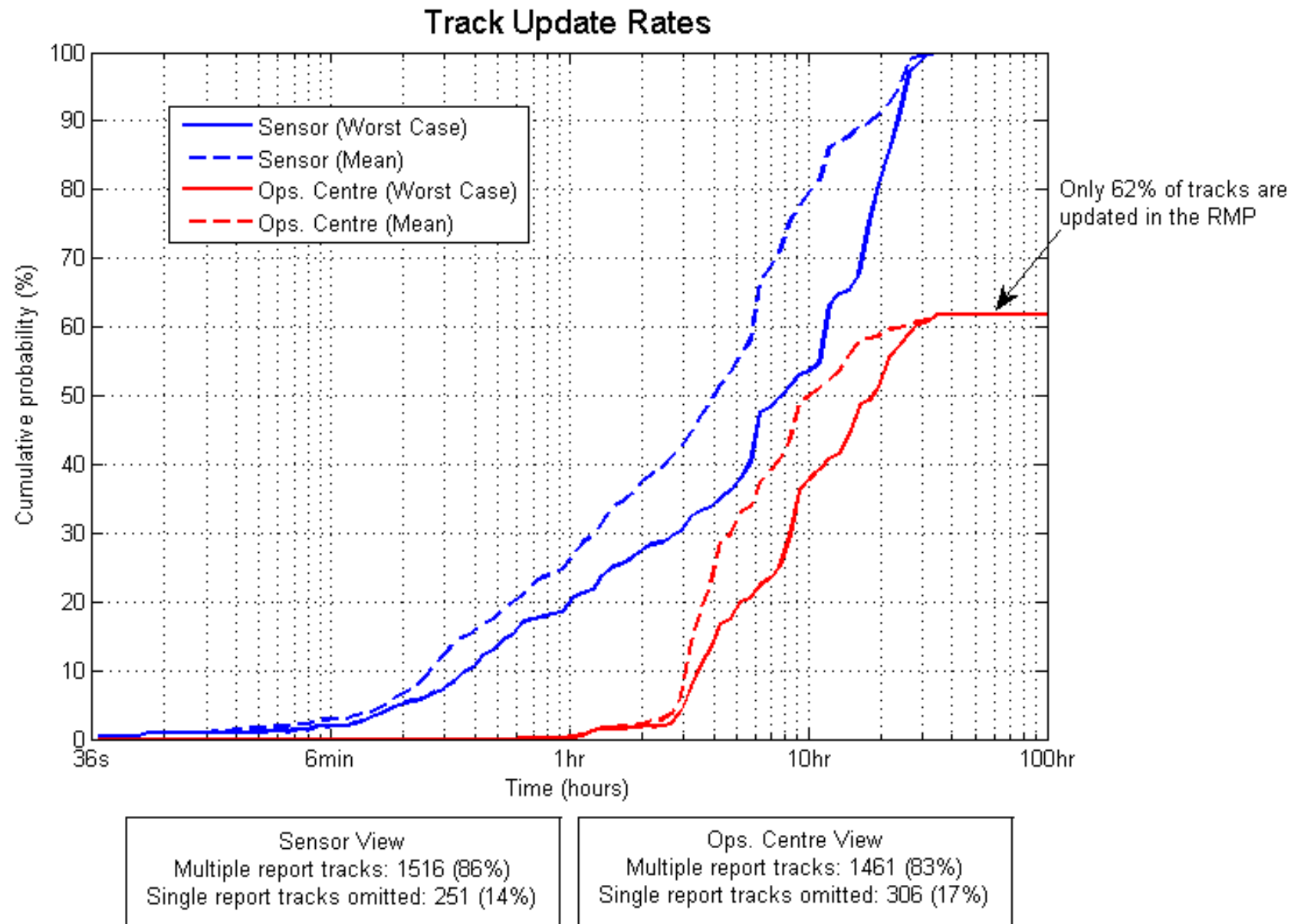
Wind, AF., Horn SA., (2009), Surveillance Analysis Workbook (SAW) Version 11.2, UNCLASSIFIED – LIMITED DISTRIBUTION, DRDC CORA TM 2009-039

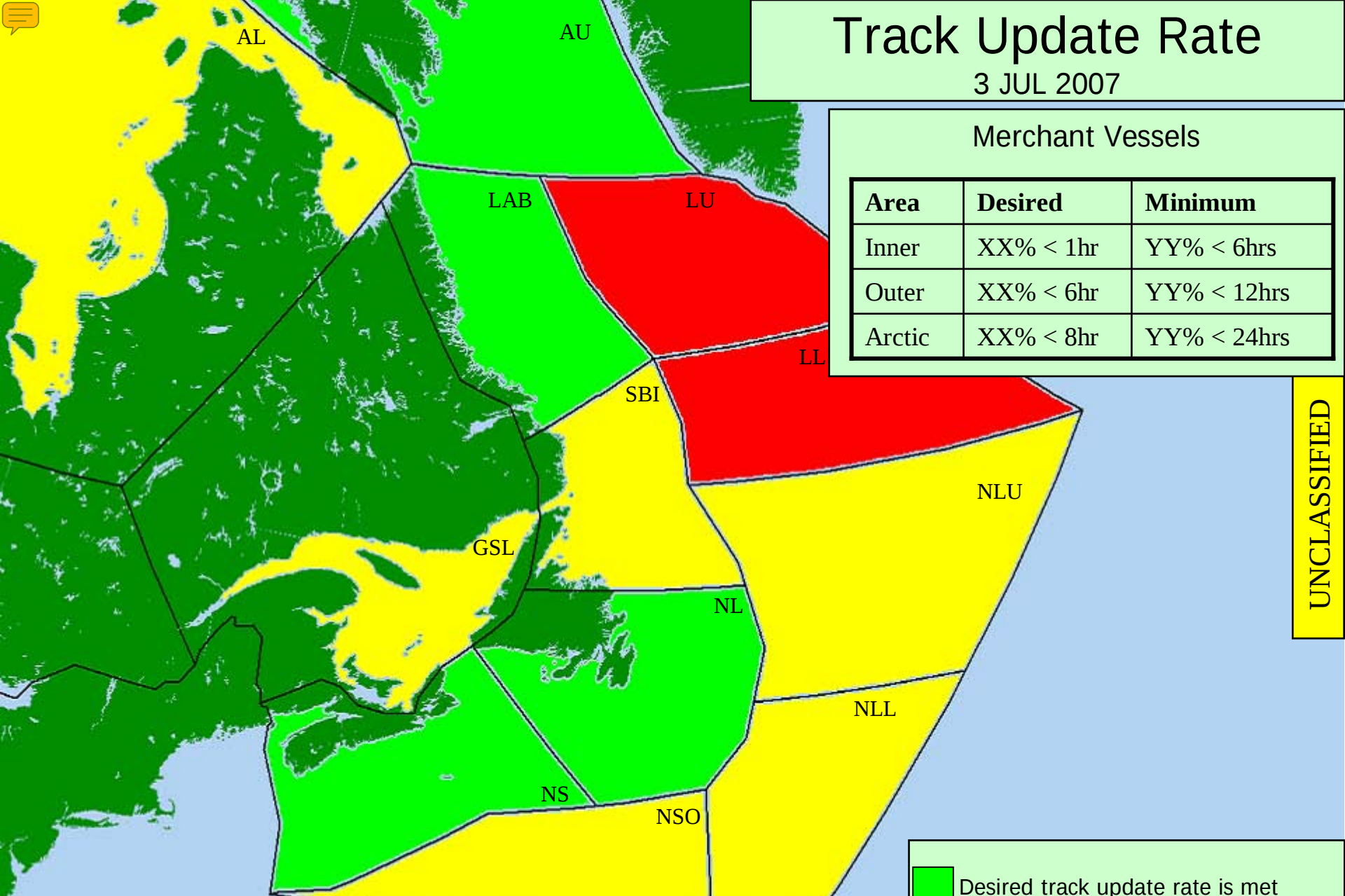


Metrics and Analysis - Tracking

- Track Update Rate
 - Assess the ability to track targets once they are identified.
 - There are two types of track update rates:





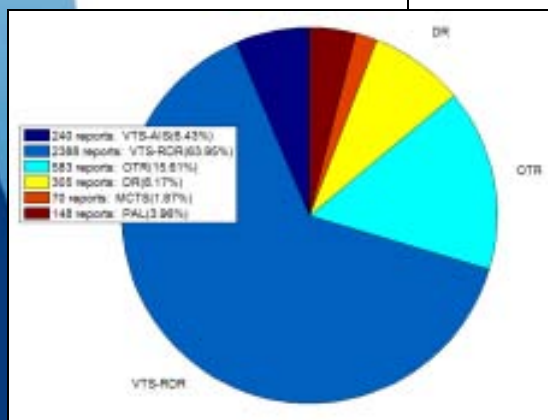
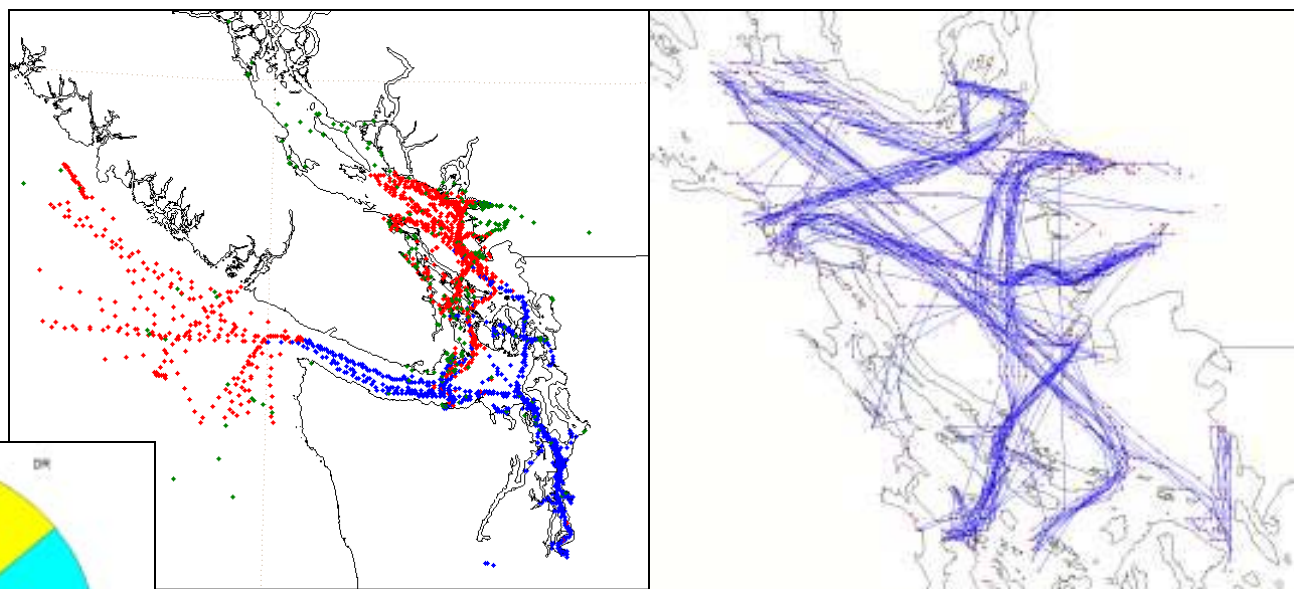


Carson NL., Smith PA., (20XX), Improving & Exploiting the Recognized Maritime Picture (RMP),
UNCLASSIFIED – LIMITED DISTRIBUTION, DRDC CORA TR 20XX-XXX



Metrics and Analysis

- Source Contribution Analysis



- Evaluate contribution in terms of:
 - Detection
 - Identification
 - Tracking



Operational Support

- Added value to RMP: from dots to MDA
- Reports provide a new way for decision makers to use MDA.
- New information for improved planning.
 - Better understanding of sensors
 - MOEs and MOPs
- Alerts and analysis to improve responsiveness.



Conclusion

- Work is continuing to improve the RMP architecture
- Continued research & development
 - New metrics, new algorithms, etc.
- Products are being deployed for use by operational staff



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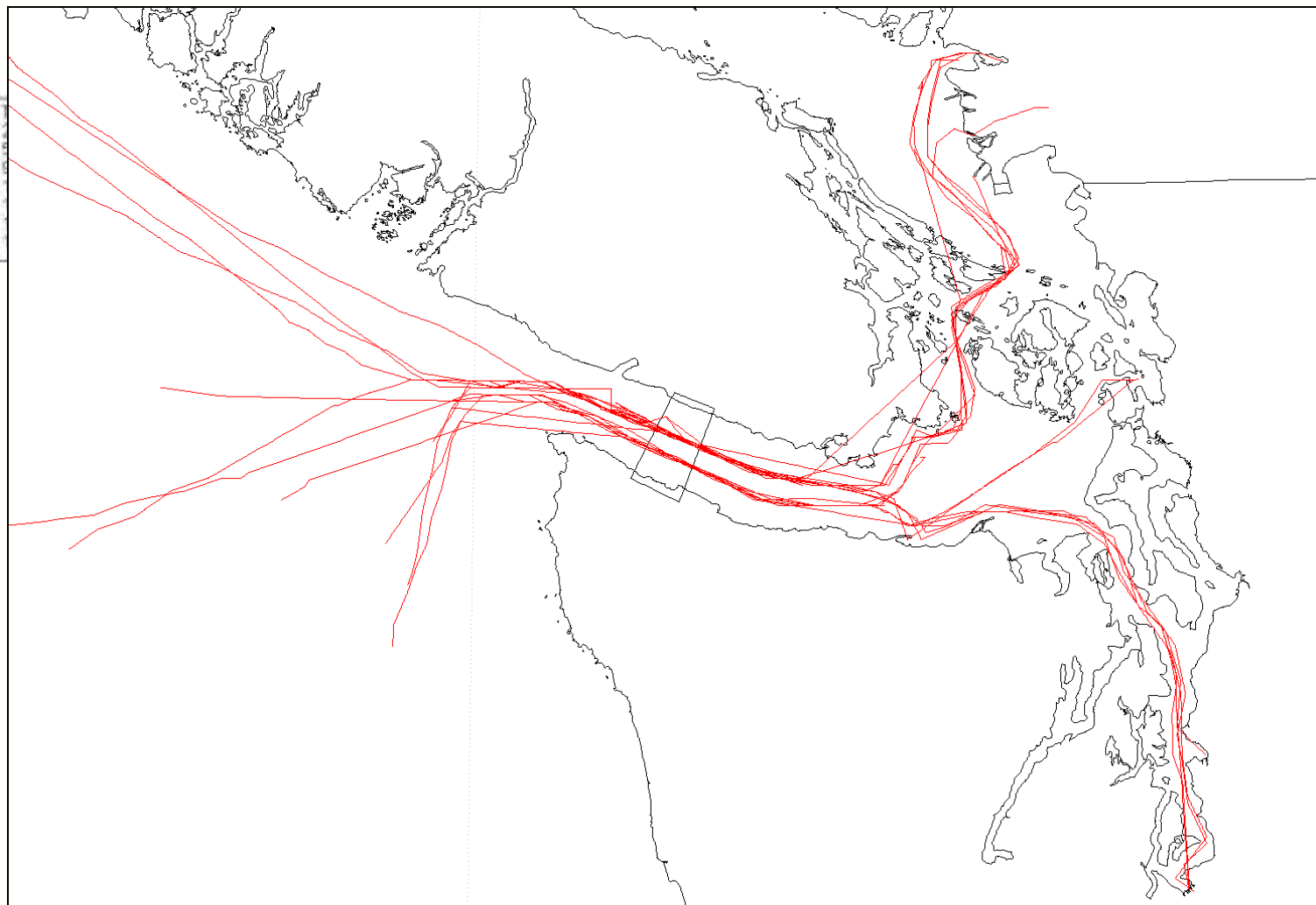
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Example: Boundary Crossing Report

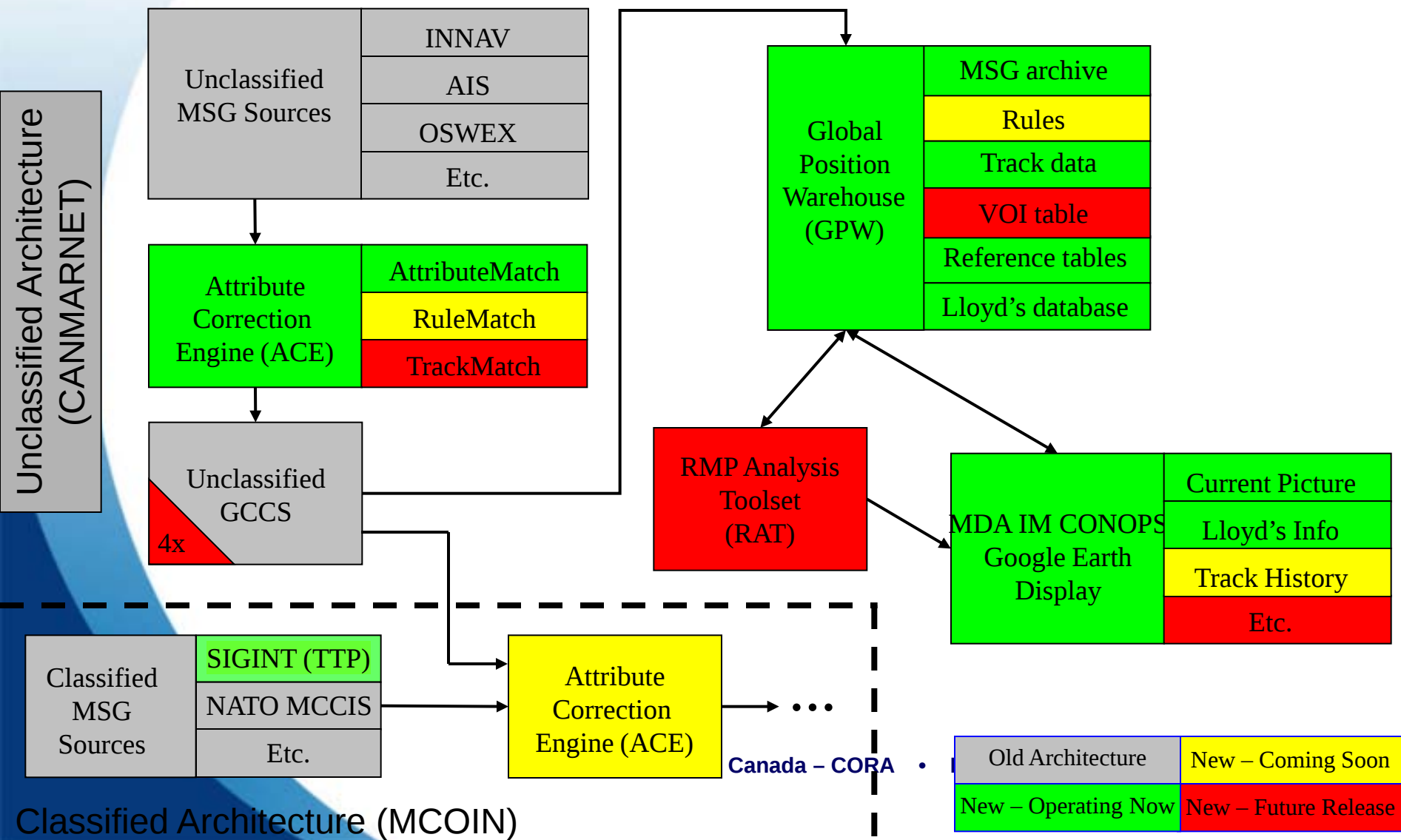


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RMP Architecture





Example: Report Density

