

# Meeting: 15<sup>th</sup> IMS Group User Consultation Meeting (UCM#15)

**Place and date:** Lisbon, 22 October 2020

**Agenda item:** 2 – Update on Automated Behaviour Monitoring (ABM) and Advanced Analytics

**Document number:** IMS 15.2

**Submitted by** EMSA

Summary	This paper provides an update on the status of the Automated Behaviour Monitoring (ABM) tool within the Integrated Maritime Services (IMS) as well as the related developments.
Action to be taken	As per Section 7.
Related documents	[1] Automated Behaviour Monitoring Workshops 1-5 Meetings' Minutes [2] HIGH LEVEL STEERING GROUP (6th Meeting) for Governance of the Digital Maritime System and Services, 20 January 2020 – Agenda Item 6.1 – Annexes B and D.

## 1. Background

The purpose of the Automated Behaviour Monitoring (ABM) tool within the Integrated Maritime Services (IMS) is to support surveillance operators and IMS users by providing an automatic detection and alerting on abnormal and/or specific vessel behaviours. The tool supports enhanced situational picture and awareness and may contribute to the process of assessing risks in the maritime domain.

## 2. Status of the ABMs

ABMs are used operationally by various IMS EU Member States and EU Bodies executing functions in maritime safety, environmental protection fisheries control, border control and security domains. For the near-real time alerting, ABM administrators can configure automatic detection of specific situations using the SefeSeaNet Ecosystem GUI (SEG) ABM administrator console. Configurations allow selection of individual ships or group of ships by flag and/or type in various areas of interest, globally. The related ABM alerting on the detection of situations matching certain algorithms is presented in the graphical interface, sent by email to the selected IMS users or provided via System-to-System (S2S) interface, to the national systems. Additionally, all the ABM triggered alerts are stored and can be retrieved via search or the area centric query (ACQ) functionalities.

The number of the ABM administrators, as well as the overall use of the ABM algorithms, has increased since the last UCM#14, including new Member States' organizations and EU bodies.

- There are over 260 ABM admin accounts granted to 20 Member States, 1 candidate country, 5 EU Bodies and EMSA.
- As of September 2020, there were over 530 running (actively used) ABM algorithms. Over 1,000 additional were used during last years and are now either stopped or terminated.
- The ABM-related alerts are distributed via over 240 distribution lists to more than 600 users. On a daily average, more than 6,000 alerts are sent to ABM users via S2S interface, by email or displayed in the SEG or IMS Mobile App graphical interfaces (SEG or the Mobile App).
- In terms of ABM S2S interfaces, these are used by: Frontex (for configuration and ABM alerting); Poland (for ABM alerting) as well as in the development of the integrated report distribution (IRD) system<sup>1</sup> (for ABM alerting).
- Since January 2020, the top five most popular ABM algorithm types, have been: 'In Area'; 'FromAreaToArea'; 'Not Reporting'; 'Drifting'; 'At Sea Encounter'. Refer to Annex 1 for the list of all available ABM algorithms.

### 3. ABM-related developments

The following developments have been completed since the IMS Group 14<sup>th</sup> User Consultation Meeting (UCM#14):

- The new ABM technical module was updated to the new version that included various bugs corrections as well as the initial implementation of the 'Zone Around the Ship' and 'Uncorrelated VDS in Area' ABMs. The latter new ABM algorithms are not yet fully operational.
- SEG ABM administrator console was upgraded to allow selection of 'favourite' vessels (Vessels of Interest – VOI) as well as importing of the VOI lists. The Area of Interest (AOI) can be now imported from .shp and .kml format files and edited.

The training activities for the new ABM administration console were conducted solely online, due to pandemic situation.

- There were 6 webinars on ABM admin console usage prepared for MS authorities, EUROPOL and EUNAVFOR.
- Additional two webinars were performed on the potential use of EMSA services/ tools in the SAR/ Salvage operations. For these two sessions ABMs were included among other topics.
- Altogether around 40 persons participated in these ABM-related training activities.

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<sup>1</sup> The "Interoperability" project between industry and competent authorities in the European Maritime Single Window (EMSW) environment under the CISE Process to facilitate ship to shore reporting

The following developments are planned during 2020-2021:

- Operational validation of the new ABM algorithms: 'Zone Around the Ship' and 'Uncorrelated VDS in Area',
- Implementation of the two ABM algorithms allowing detection and alerting on: i) the navigational status change and ii) line crossing;
- Use of the 'SafeSeaNet enrichment' in the filtering of vessels of interest<sup>1</sup>;
- First implementation of the combined ABM algorithms;
- Historical ABMs implementation in the Cloud-based infrastructure;
- Technical adaptations in the STAR ABM module.

#### 4. ABM and Advanced Analytics Workshop 5 - outcome

The 5th Automated Behaviour Monitoring (ABM) and Advanced Analytics Workshop took place on the 04 December 2019. This event followed the ABM Workshops held annually for the purpose of presenting and discussing the ABM developments, sharing best practices, and discussing potential future changes. The outcome of the WS can be summarized as follows:

- Member States and EU bodies provided feedback on the operational use of ABM algorithms and expressed priorities for future developments.
- EMSA presented the current status of the ABMs, moderated discussion on the priorities for the data analysis products and provided a demonstration of the 'pilot' implementation of the data maritime analytics scenarios in a new dashboarding tool (EMSA Maritime Analytics Tool prototype).
- Specific data analytics information-sets and scenarios were discussed.
- EMSA invited volunteers for the validation of the 'pilot' data analytics scenarios using the above-mentioned tool. See also the document IMS 15.4.2.
- A discussion on the dedicated ABM Mobile app was initiated. Member States and EU bodies participated in the identification of the ABM Mobile app use case scenarios.
- Participants acknowledged information on the IMS Group decision on the planned phase-out of the old ABM admin interface – WUP, following the introduction of the SEG version 1.10.
- Member States and EU Bodies received presentation on how ABM services are utilized in the context of 'interoperability' project<sup>1</sup>.
- EBCGA (Frontex) shared experience on the ABM S2S interface, used for the provision of 'anomaly detection' services to their users.
- Participants were requested to analyse needs for the usage of 'data quality indicators' in the Sat-AIS position reports and their potential application for the ABMs.
- The following future developments were considered as high priority for the active users of the ABMs:
  - i) Inclusion of the Earth Observation (EO) product – Vessel Detection Service (VDS); ii) Usage of the 'navigational status' indicator (with focus on the 'Not Under Command' status) in the ABM algorithms.
- Participants underlined an importance of the ABM algorithms combination capabilities.
- Additionally, participants were given a status report on the on-going works for the improvement of the reference databases (OVR and CSD).
- ABM trainings and training materials were discussed.

## 5. ABM interfaces

The following interfaces are available for displaying the ABM related information (generated alerts) as well as for the configuration of the ABM algorithms.

Functionality	ABM configuration	ABM- alerting mechanism	Configuration of the ABM alerts distribution
Interface	S2S  SEG (new interface) *	S2S  SEG (new interface) *  IMS Mobile App  E-Mail	EMSA Maritime Portal (new interface)

Table 1 – ABM interfaces

*\* The WUP ABM admin configuration was phased-out with the introduction of the SEG-based ABM admin console and the implementation of the changes in the SEG 1.10 version.*

## 6. ABM admin tool

Access to the ABM administrative (configuration) tool can be requested to [Lukasz.BIBIK@emsa.europa.eu](mailto:Lukasz.BIBIK@emsa.europa.eu) with copy to [ims@emsa.europa.eu](mailto:ims@emsa.europa.eu). Urgent requests for setting ABMs via EMSA can be sent directly to the 24/7 EMSA's Maritime Support Services email: [MaritimeSupportServices@emsa.europa.eu](mailto:MaritimeSupportServices@emsa.europa.eu) .

## 7. Action required

IMS Member States are requested to take note of the current ABM status, planned developments, analyse own operational needs for the ABM related services and communicate them to EMSA;

## Annex 1

The following twenty-four ABM algorithms are available for operational use:

1. Anchored vessels detected – (*Anchorage*)
2. Vessels entering a closed area at a specific time- (*TimeAndPeriodOfDay*)
3. Change of heading higher than a threshold (e.g. more than 20 deg.)- (*SuddenChangeOfHeading*)
4. Sudden change of speed- (*SuddenChangeOfSpeed*)
5. Frequency of vessels' position reports higher than expected – (*OverReporting*)
6. Passage of a vessel close to the shore – (*DistanceToShore*)
7. Passage of a vessel close to an area of interest – (*DistancetoArea*)
8. Vessels approaching one another closer than an indicated distance, with a speed below defined threshold – (*AtSeaEncounter*)
9. Vessels entering or leaving ports\* – (*AtPortAtSea*)
10. Entry of a particular vessel(s) to an area of interest – (*InArea*)
11. Change of speed above or below a limit set – (*SpeedAnomallyOverPeriod*)
12. Vessel leaves Area of interest X and enters Area of Interest Y – (*FromAreaToArea*)
13. Vessel reports position outside an Area X – (*OutArea*)
14. Vessel is switching off transponder – (*NotReporting*)
15. Port of Departure is X\* – (*DesignatedPortofDeparture*)
16. Port of Arrival is X\* – (*DesignatedPortofArrival*)
17. Vessel is drifting – (*Drifting*)
18. Vessel departs from coastline – (*HeadingOffShore*)
19. Vessel heads towards coastline - (*HeadingtoShore*)
20. Spoofing- change of position/ out of range – (*SpoofingPositonInError*)
21. Change of speed above or below a limit set outside port\* – (*SpeedAnomallyOverPeriodOutsidePort*)
22. Anchored vessels outside port\* – (*AnchorageOutsidePort*)
23. Frequency of vessels' position reports lower than expected – (*UnderReporting*)
24. Sudden Change Of Speed Outside Port\* - (*SuddenChangeOfSpeedOutsidePort*)

\*Port related ABMs are linked to the UNECE location codes.

