European Maritime Safety Agency
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Automated Behaviour Monitoring Workshop 2

Meeting Minutes

Held in Lisbon on

28 September 2016

Version 1.0
Date:24 October 2016

List of Abbreviations

AIS	Automatic Identification System
ABM	Automated Behaviour Monitoring
AOI	Area of Interest
CSD	Central Ship Database
EC	European Community
EFCA	European Fisheries Control Agency
EMSA	European Maritime Safety Agency
EU	European Union
FRONTEX	European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union
IMDatE	Integrated Maritime Data Environment
IMS	Integrated Maritime Services
LRIT	Long Range Identification and Tracking (vessel position data based on telecommunication satellites)
IUU	Illegal Unreported and Unregulated Fishing
MAOC-N	Maritime Analysis and Operations Centre – Narcotics
MRS	Mandatory Reporting System
MSS	EMSA's Maritime Support Services
SADV	Statistical anomaly detection
SAT-AIS	Satellite Automatic Identification System (AIS data transmitted by satellite)
SSN--EIS	SafeSeaNet European Index Server
VDS	Vessel detection system (vessels identified on satellite images)
VHF	Very high frequency (radio signals)
VMS	Vessel Monitoring System (tracking of commercial fishing vessels based on communications satellites)
VOI/ TOI	Vessel (Targets) of Interest
VTMIS	Vessel Traffic Monitoring and Information System
WUP	Web User Portal, also referred to as web user interface

Background

EMSA hosted a second, operational workshop on Automated Behaviour Monitoring (ABM). Automated Behaviour Monitoring (ABM) are Integrated Maritime Services (IMS) tools analysing position reports for the detection of specific behaviour, and have been in use for surveillance purposes by a large number of Member States and EU Bodies already for some time.

Meeting programme

1. Opening and welcome

The meeting was opened and chaired by Mr Ivo Kupsky, Head of Unit Digitalisation and Application Development and supported by other **EMSA** Project Officers. The EU member states and the EU Bodies actively using or developing ABMs for surveillance purposes attended the meeting. Delegations attended from: **France, Ireland, Italy, Latvia, Malta, Poland, Sweden, The Netherlands, and United Kingdom** as well as from the European Agency for the Management of Operational Cooperation at the External Borders (**Frontex**), the European Fisheries Control Agency (**EFCA**) and Maritime Analysis Operation Centre – Narcotics (**MAOC-N**). Following the opening, the chairman welcomed the participants, introduced the ABM state-of-play (see section 2) and the main objectives of the meeting, which were to:

- Gather knowledge and share operational experience on the ABM algorithms, as well as;
- Discuss new requirements and possible future developments.

The agenda (see **Annex 1**) was presented and adopted without change. The list of participants is presented in **Annex 2**. All the meeting documents may be obtained at: http://emsa.europa.eu/workshops-a-events/188-workshops.html .

2. Agenda items

The following agenda items were discussed subsequently:

- (2), (3) IMS ABM operations - Introduction to new ABMs; ABM operational feedback and operations;
- (4) Access to IMS ABM administrator module: Member State and EU bodies experience and expectations;
- (5) ABM developments and requirements.

In summary, the ABM algorithms and tools are positively perceived and used in different operational contexts, by various communities. There is a need for specific improvements as well as future developments that will address the requirements for the new data sets.

The current ABM use was presented by **EMSA.** ABMs are used by 3 Member States and 3 EU Bodies. Four of them have been granted with the ABM Administrator functions. As of 28 September 2016, there are 59 active ABMs.

As per agenda points 2, 3 and 5, users actively contributed to the discussions. **All participants** provided their operational feedback, experience or expressed the expectations related to the ABMs. The following, main discussion points were noted:

- Operational Vessel Registry (OVR) in the IMS – The vessel reference database requires further improvement to resolve the issues of the outdated identifiers. The OVR is also used by the ABMs and therefore impacts the proper detection of specific events.
- There is a desire to use of the Vessel Detection Service (VDS) products related to Earth Observation (EO) data, in the ABMs in the future. Specific use cases were discussed. **SE** underlined the aspect of the EO imagery planning in this context.

- The use of the data from the AIS position reports should be expanded according to the participants e.g. to add additional attributes and filters in the ABM. A use case for the 'navigational status' changes detection was given by **IT**.
- Data obtained from the SafeSeaNet EIS is considered very useful in the ABM context and its use should be further explored. Participants discussed the use of: port of destination, last 10 port calls and other elements in this context.
- It was proposed to **EMSA** to investigate a possibility of creating distribution list by the ABM admins. In this context, participants recommended the use of the contacts of the registered IMS users only, so as to ensure that the data is not disclosed to third parties or other Member States.
- As proposed by **SE**, distribution lists with ABM admins userids should be created. This will help in the operational validation of the algorithms.
- **EFCA, MT, LV, PL, IE** expressed their interest in the ABM admin functions.
- **PL, IT and LV** supported the System-To-System (S2S) approach for the provision of the ABM generated alerts. **PL** recommended XML or JSON via HTTPS solution, to facilitate the implementation in the National system(s).
- **FR,** supported by **MAOC-N** and **PL** asked how the data used in the ABM (e.g. lists of the vessels of interest) is protected.
- It was concluded that the ABM admin functions can be provided, on request, to a limited number of users (max 2-3) in each Member States.
- **EMSA** presented the operational experience related to the impact of the delayed position reports (standard in case of S-AIS data) on the ABMs. Following the discussion it was concluded that the alerts shall be still generated, even if related to the antecedent position reports. **IE** proposed an application of a colour coding for the ABM alerts, to reflect the timestamp 'age'. In similar context **FX** requested a clarification on how quickly the specific situations are detected.
- **LV** thanked for the training provided earlier in September by EMSA and requested for the material to be used for the ABM awareness campaign for Customs at National level.
- **MAOC-N** shared the experience of the ABM use and the recent training for the ABM admin as well as confirmed specific use cases related to the analysis of the static and dynamic data used for profiling vessels.
- **UK** confirmed distribution of the ABM questions at National level as well as the intention to raise the awareness of the ABM tools capabilities, among the current IMS users community.
- **IE** stressed the need of the continuous training of the IMS users and presented analysis of the ABM user manual content and structure.
- Following a question from the **NL, EMSA** demonstrated the cross-platform capabilities of providing and geo-locating the ABM alerts, which will be accessible in the new version of the IMS Mobile App.
- **IT,** following the input on the 'rule based' approach used in their National system**,** presented also a paper dealing with the detection of false position reports based on AIS. The paper will made available on the EMSA web page together with other WS materials.

All participants were requested to elaborate further on the questions on the ABM scalability (how capable the service should be) as sent before the WS.

Additionally, the following action points, derived from the operational discussions, were noted:

- There is a need for the common dictionary and harmonized terminology in the ABM context. **All participants** are encouraged to propose the naming conventions for the ABMs.
- ABM operational user manual is highly desired by the participants. **IE** analysed the content of the existing document and presented the first, preliminary conclusions. The manual requires changes to reflect end-user operational needs as such it has to be simplified. **EMSA** and **IE** will propose a first draft.
- In the same context, when describing validation campaigns with real vessels off Poland, **FX** raised the issue of the definition of specific parameters when setting ABMs. Specific aspects should be explained in the ABM manual and put in the context of the maritime experience. Overall objective would be to better serve the ABM admin users. It was also noted that some examples of the best operational practices (e.g. how to set the ABM in specific areas or with specific information sources) would assist in the operational use of the ABM tools.

As per agenda point 4, the **Member States (FR, NL)** and **EU Bodies (MAOC-N, Frontex)** administrators shared their experience on the use of the ABM admin tools. Despite the positive feedback some improvements were proposed for the tool itself. The need for the clear user manual with best practices and use cases was also underlined. Additionally, the future of the ABMs, ABM admin tool and related alerting, was discussed in the context of the development of the future, single SafeSeaNet Graphical User Interface (SEG).

'Business analysis' use cases (analysis of the historical static data of specific vessels) as well as the requirements for the operational, communication tools (chat rooms) were mentioned by the participants. It was however concluded that these specific developments should be discussed in the framework of the IMS User Consultation Meetings (UCM).

The outcome of the discussions is reflected in the **Annex 3** (requirements) and **Annex 4** (action points).

The follow-up actions from ABM Workshop 1 (02 December 2015) summary was not presented due to the time restrictions and will be distributed with the Minutes of this meeting. Additionally the status of the actions is provided in **Annex 5**.

3. Prioritization of the next developments

Under agenda points 2 and 5, **EMSA** presented the list of planned next ABM related developments which was followed by a round table discussion on the priorities. As per discussion, it was concluded that most of the participants places the highest priority on the following, planned ABM algorithms:

- Indication that a vessel may be switching off her transponder (position reports will be compared with the expected frequency per position system);
- Indication that the vessel may be drifting;
- Detection of the events related to the vessels leaving a specified Area of interest A and subsequently entering the Area of Interest B.

4. Closing remarks

Participants were asked to assess the meeting and the discussion. They were very pleased with the information sharing and discussions and expressed request to continue with thematic IMS workshops. The meeting was closed following the evaluation.

Annexes

Annex 1 – Meeting Agenda

Annex 2 – Participants List

Annex 3 – Vessel anomaly detection and ABM requirements

Annex 4 - Action points

Annex 5 – Status of the action points from the ABM WS 1

Annex 1: Agenda

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Annex: Draft agenda for the 2nd ABM Workshop

Wednesday, 28 September 2016

Time	Agenda Item	Speakers/Comments
09:00 – 09:30	**Registration and coffee**	
09:30 – 09:45	1. Welcome, opening, introduction	EMSA
09:45 – 11:00	2. IMS ABM operations ■ Introduction to new ABMs ■ ABM operational feedback	EMSA / MS / EU Bodies
11:00 – 11:15	**Coffee break**	
11:15 – 12:30	3. IMS ABM operations – cont. ■ Follow-up from ABM Workshop 1 (December ■ 2015)	EMSA / MS / EU Bodies
12:30 – 13:30	**Lunch break**	
13:30 - 14:00	4. Access to IMS ABM administrator module: Member State experience and expectations.	MS (e.g. NL/ FR) + EMSA
14:00 – 15:00	5. ABM developments and requirements ■ ABM via S2S (and other) requirements ■ MS ongoing projects ■ EU Bodies ongoing operations/ projects	MS / EU Bodies
15:00 – 15:15	**Coffee break**	
15:15 – 15:30	6. Summary of the WS	MS / EU Bodies / EMSA
15:30 – 16:00	7. AOB, summary, conclusions	All

Annex 2: Participant List

Herve Guichard, Directorate of Maritimes affairs, France
Shane Cormac Dillon, Irish Coast Guard, Ireland
Giuseppe Aulicino, COAST GUARD, Italy
Deniss Bickovs , Latvian Coast Guard Service, Latvia
Christopher Sciberras, Department of Fisheries and Aquaculture (DFA), Malta
Andrzej Kalata, Maritime Office Gdynia, Poland
Michael Risley, Maritime Analysis and Operations Centre (Narcotics) - MAOC(N)
Paulo Silva, MAOC (N)
Carlos Saraiva, MAOC(N)
Lennart Dreier, Swedish Coast Guard, Sweden
Tom Kleinen, NLCG, the Netherlands
Phil Bostock, Maritime and Coastguard Agency, United Kingdom
Fredrik Lindblom, European Fisheries Control Agency
Marcin Pempus, Frontex
Samuel Djavidnia, EMSA
Paulo Neiva Fernandes, EMSA
Andrea Pelizzari, EMSA
Nuno Barruncho, EMSA
Lukasz Bibik, EMSA
Dario Cau, EMSA
Justino De Sousa, EMSA
Ivo Kupsky, EMSA
Oscar Rodriguez Villaamil, EMSA
Marc Journel, EMSA
Yann Le Moan, EMSA

Annex 3 – Vessel anomaly detection and ABM requirements

No.	Requirement
1	Synchronize the IMS/ ABM vessel reference database with IMDatE WUP to obtain the most up-to-date information on the ship identifiers
2	Use the EIS (European Index Server) SafeSeaNet data in ABM filters. Allow filter options for the vessels: destination last 10 ports
3	Detect when ships leave specific ports
4	ABM Filter - provide an option for the user to be alerted only when the exact criteria are met and ignore the 'Null' values
5	Analyse the possibility of inclusion of the ABM alerting related to the ship's company change
6	Exclude the detection in the Port areas for some ABMs
7	Use VDS data in ABMs – e.g. for the detection of the vessels which are not correlated (not identified) in specific situations
8	Introduce a line crossing detection in the ABMs
9	Detection of the fishing vessel with a 'not a trawling speed'
10	Include year of built in the ABM filter
11	Detect a flag change in the ABM
12	Analyse the past behaviour of specific ships – e.g. for the profiling the ship based on the past information

13	Introduce a colour coding of the alerts, based on the timestamp of the alert
14	Harmonize the units of measures in meters/ or nautical miles in the ABMs as per user preferences
15	Allow the ABM admins to create distribution lists for the ABMs from the registered users
16	For the list of vessels - do not use the EMSAID but the actual identifiers on the list
17	Use the navigational status of the ship in the ABM
18	Create a default distribution lists containing only the ABM admins from MS
19	Use multi polygons for the ABMs
20	Reuse the Area of Interest (AOI) previously created by users
21	Analyse the use of the ABMs as an event log for each vessel – meaning that the ABM alerts are linked to the track of the ship
22	In the ABMs, use the information ‘Change of the output power’ of the AIS transponder, as provided in the VDM messages from the regional AIS servers
23	A basic monitoring tool for the ABM admins should be provided

Annex 4 – Action points – ABM WS2

No	Action	Responsible	When
1	There is a need for the common dictionary and harmonized terminology in the ABM context (ABM naming convention, parameters etc.).	ABM users and EMSA	Proposal to be presented for the next ABM WS.
2	ABM operational user manual to be drafted	EMSA and IE	The first draft to be send during 2016.
3	Include the best practices and parameters setting	ABM users and EMSA	To be added to the first draft of the manual. Proposals to be provided before the next ABM WS.
4	Confirm how the MS data is protected	EMSA	To be sent to all ABM users before the next ABM WS.
5	Continue with the ABM capacities definition	ABM users and EMSA	Answers to the questionnaire sent to be provided by correspondence by the end of 2016. Input data to be used in the future ABM developments.
6	Send the list of action points and requirements following ABM WS1	EMSA	To be distributed together with the ABM WS2 report.
7	Improve the quality of the IMDatE OVR by synchronizing it with the CSD	EMSA	Possible solutions shall be analysed by the end of 2016.
8	Prepare the ABM WS" MoM (report) and distribute to MS and publish together with the WS presentations	EMSA	By the end of November 2016.

Annex 5 – Status of the action points from the ABM WS 1

No	Action	Responsible	When	Status
1	Consider and propose a generic framework and architecture for anomaly detection in maritime surveillance systems.	EMSA	Proposal to be presented during 2016	**Completed** • General Framework for IMS via IFCD • IMS Group Terms of Ref to be discussed at next HLSG
2	Examine options for supporting the cooperation and developments in the area of the expanded anomaly detection and ABMs.	EMSA	To be consulted with the COM and MS before/during one of the SSN HLSG meetings in 2016	**Completed** • General Framework for IMS via IFCD • ABM topics included in IMS Training
3	Explore and reflect the MARNIS project experience as a reference for the future developments in the anomaly detection and ABMs.	EMSA and UK	To be presented at the next meeting in 2016	**Pending**
4	Examine possibility 'open source' approach for ABMs, (outcomes of the projects and developments could be shared).	EMSA and MS	Results to be presented at the next meeting in 2016	**Pending –awaiting feedback**
5	Agree on the next meeting of the active Anomaly Detection Systems and Automated Behaviour Monitoring users.	EMSA and MS	-	**Completed**

6	Modification of existing + new requirements should be analysed + Feasibility and implementation	EMSA	To be presented at the next meeting in 2016	**Completed** • 26 analysed, 4 completed, 7 under development
7	To implement some of the high-priority Use Cases identified during the workshop using the existing ABM framework and perform a validation campaign with a few MS users	EMSA	During 2016	**Completed** • 8 new ABMs planned for 2017 • Validation campaign to be performed
8	Prepare and distribute MoM ABM WS1.	EMSA	During January 2016	**Completed**

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