

Guidelines for the development of an operational IMS Drift Modelling tool to be used for Search and Rescue and other Maritime Safety purposes.

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List of Annexes

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Change Control History

Version	Date	Edited by	Description
1.0			
1.1			
1.2			
1.3			
1.4			

Acronyms

AIS	Automatic Identification System
EMSA	European Maritime Safety Agency
EU	European Union
MS	Member State
SEG	SSN Ecosystem Graphical User Interface
SSN	SafeSeaNet

1 Background

As agreed at the IMS Group 12th User Consultation Meeting (UCM#12), the IMS Correspondence Expert Group on “Drift Modelling” should propose Guidelines for developing an operational IMS Drift Modelling tool to be used for Search and Rescue and other Maritime Safety purposes. These Guidelines shall take into consideration the following high-level principles:

- The Tool shall at least follow the IAMSAR Standards and Recommendations¹;
- The Tool shall support cross-sectoral and cross-border cooperation, and where necessary, collaboration;
- EMSA will not develop a new proprietary Drift Model, but will include the possibility to connect to several existing state-of-the-art drift models through standard interfaces, hence allowing to benefit from the drift model most adapted to the local circumstances of the event;
- The Tool shall be simple and intuitive for operators of all levels and experiences.

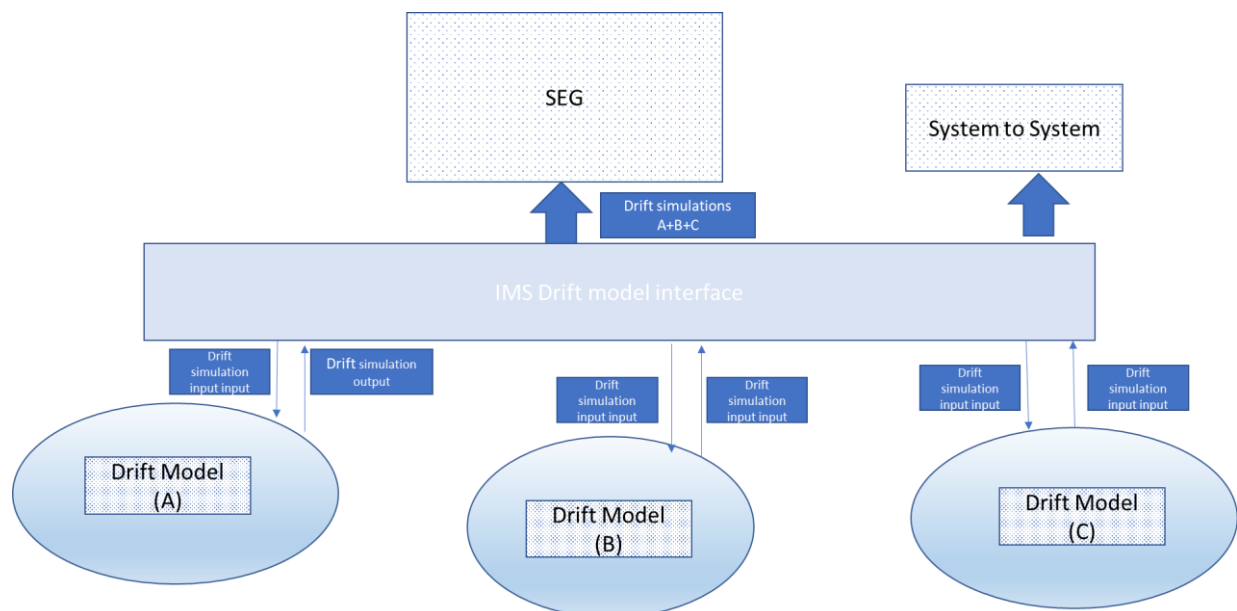


Figure 1: Overview of IMS Drift Modelling project

¹ During the 2nd expert group meeting, it was agreed that the IMS interface should also propose access to drift models using probabilistic method such as for example Monte Carlo.

2 Objective of the requirements

The SAR drifting model tool will allow to:

- Create and retrieve the results of a drifting simulations from existing model(s)
- Present the results in SEG GIS interface of an estimated location in time of a vessel or a feature² detected at sea, with capacity to simulate estimated location in the future and in the past (backtracking)
- Display a search pattern on top of the integrated maritime picture
- export the results

During the initial phase of the project, EMSA will select models that are already connected to Metocean sources. In addition, the users will have the possibility to insert wind and current manually. In medium term, it will be investigated on how to access and/or connect to different ocean-meteorological data sources for simulation purposes.

The objective of the Guidelines is to identify the features and functionalities to be implemented in order to make use, via the IMS Drift Modelling Tool, of one or several Drift models for the purpose of search and rescue and maritime safety.

3 High level requirements

The following requirements will be explicated to support the development of an operational IMS Drift Modelling tool:

- Identification of user workflow (e.g. request one (or more) simulations to be routed to "external" model(s));
- List of configurable drift parameters for input to the model;
- List of different types of objects whose drift should be simulated;
- Options for display of drift results (e.g. probability of results);
- Definition of user specific near-real time met-ocean data inputs;
- Configuration, selection and display of search patterns based on the output model results;
- Display of results in the SEG

² Feature: any emerged object that may drift at the sea surface, including life-raft, life saving boat, container, debris resulting from maritime or aerial incidents, other maritime safety relevant objects

3.1 Identification of user workflow

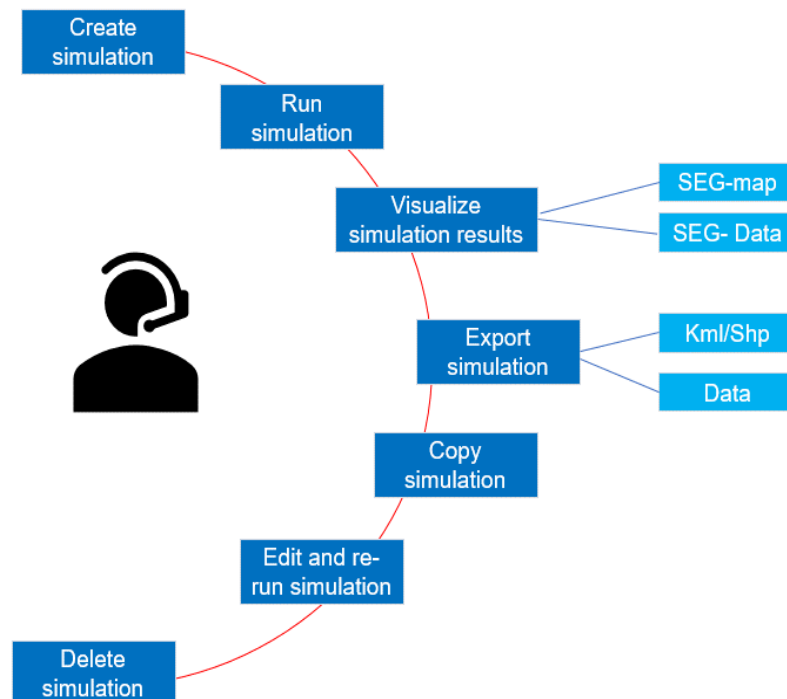


Figure 2: Workflow

3.1.1

Create the Simulation

The user shall be able to create a simulation. The interface shall display a page with all Mandatory and Optional elements as per requirements 3.2.

3.1.2

Run the Simulation

The user shall be able to run the simulation after inserting all mandatory attributes.

3.1.3

visualise the Simulation

The user shall be able to visualise the result of the simulation as defined in the Chapter 3.7.1.

3.1.4

Export the Simulation

The user shall be able to export the result of the simulation as define in the Chapter 3.4 and 3.7.

3.1.5**Copy the Simulation**

In order to gain time, the user shall be able to copy a previous simulation, rename it, amend the necessary attribute and launch a new simulation.

3.1.6**Edit and Re-run the Simulation**

The user shall be able to re-open a previous simulation, edit it and re-run it.

A functionality should allow to re-run automatically the simulation extending it 24h.

3.1.7**Delete the Simulation**

The user shall be able to delete a previous simulation including the results provided.

3.1.8**Run several simulation**

The user shall be able to overlap more than one simulation at the same time and display them simultaneously in SEG

3.1.9**Select more than one object in a simulation**

The user shall be able to run one simulation with two different objects/drifters;

3.2 List of configurable drift parameters for input to the model

input parameters

The parameters for running a simulation are identified by the bullet points below. In red the non-mandatory parameters.

Simulation description

- Name
- Description
- Type (chose one of the 2 values)
 - forward
 - backward

Model(s) selection and calculation method

The user will select one or several model(s).

The possible calculation method(s) will be automatically displayed per model. For models proposing 2 methods, the user will choose 1 or both.

- Model 1
 - IAMSAR (Automated Manual Solution)
 - Probability grid (e.g. Monte Carlo)
 - Level of uncertainty (high, medium, low)
- Model 2
 - Probability grid (e.g. Monte Carlo)
 - Level of uncertainty (high, medium, low)
- Model 3
 - IAMSAR (Automated Manual Solution)

Drifter

- Drifter type (chose between the available values, see requirements 3.3)

Initial conditions

- Geometry (Point/Polyline)
- Latitude³
- Longitude

³ The IMS drift modelling tool shall allow creating a simulation when clicking on a ship position (current or in the past) or a bookmark position.

- Radius (applied to a position to define an initial area)
- Number of particles (for probabilistic models)
- Time start drift
- Safety factor

Simulation duration

- Default 24h (past or future), if different then:
 - Start Time
 - End Time

MetOcean input: see chapter 3.5 for the general Metocean sources and data. The 2 parameters below will be required for the operator to force the model with observed and predicted local and/or regional values.

- Wind (speed and direction)
- Current (speed and direction)

Model interval calculation: identify the time period between model calculations for a simulation.

- Default interval (in minutes, to be agreed)
- Customised interval (minutes)

3.3 List of different types of objects whose drift should be simulated;

Title: Drifters definition

The IMS interface will make available objects as identified below:

- **Common objects:** The interface should be capable of compiling a common list of objects for SAR and maritime Safety purpose.
- **Specific objects** when available only in one model. It will be selectable by the user upon choosing a model for simulation. These objects shall be addressing SAR and maritime Safety purpose.

3.4 Options for display of drift results (e.g. probability of results);

Title: Display geometry

- **Time element:** the interface should show the evolution of the drift in time e.g. via a time slider/timeline. The frequency (time interval) of the output displayed will be by default equal to the **Model interval calculation** as defined in 3.2 above.
- **A trajectory** should be available
- **A polygon** (that includes the probability of presence) should be available

3.5 Definition of user specific near-real time met-ocean data inputs

Title: met-ocean data inputs

For the initial project phase, the drift models selected will use their currently integrated Metocean models.

As a long term perspective the interface should allow to:

- connect to the different Metocean sources to be made available via EMSA
- connect to Member States national source(s) directly to provide higher resolution in certain areas (e.g. where the conditions change rapidly).
- Provide to the user the suggestion of suitable wind and current data available for the specific location

3.6 Configuration, selection and display of search patterns based on the output model results

3.6.1

Title: search patterns available

The following visual search patterns (IAM SAR, volume 2, chapter 5.5) shall be available in the interface:

- Sector search
- Expanding square search
- Track line search
- Parallel sweep search
- Creeping line search
- Creeping line search, co-ordinated
- Shoreline search

3.6.2

Search pattern configuration

The user will be able to:

- **Select** the relevant pattern (see 3.6.1)
- **Draw** it by setting the relevant parameters (e.g. datum and or common search point, radius, angle, S (track spacing) etc..).
- **Display** it on top of the maritime picture and the drift simulation

3.6.3

Search pattern export

- Search patterns should be exportable in different formats (e.g. WMS, CSV, etc..) for being shared with e.g. SAR assets.
- The possibility to export the search pattern in AIS compatible format (e.g. ATon) will be explored.

3.7 Display of results in the SEG or via other means (S2S)

3.7.1

Display of results via SEG

- The result(s) of the drift simulation should be available as an overlay on top of the integrated maritime picture. The operator will choose to display or not specific IMS layers below the drift simulation.
- The wind and currents used by the model should be visible on the user interface.
- Overlapping more than one simulation should be available in order to compare results.

3.7.2

Results via S2S

The Drift simulation service shall be accessible via web services (system 2 system), to allow for integration into national SAR/maritime safety applications.

3.7.3

Display of results via Mobile App

The result(s) of the drift simulation should be available as an overlay on top of the integrated maritime picture in the Mobile App

3.7.4

Access rights

INFO: The IMS access rights will be created in the EMSA Identity Management (IDM) system for

- Creating and sharing the simulation and the search pattern and;
- Visualising the results.