

2nd IMDatE Meeting

IMDatE Functional Prototype

19/10/2012

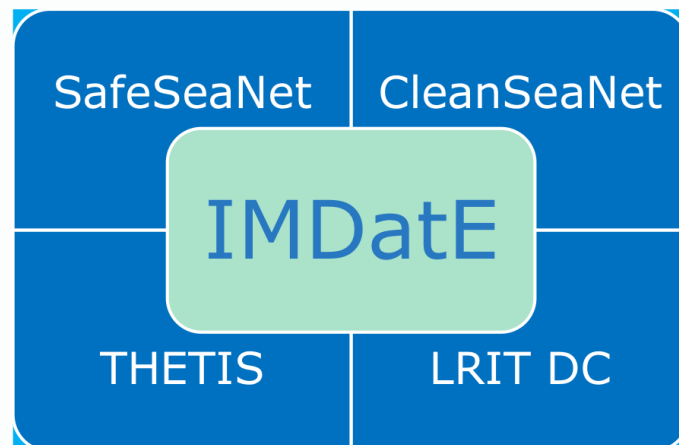
Justino de Sousa

**European Maritime Safety Agency
C.3.1 Integrated Maritime Data**

Integrated Maritime Data Environment (IMDatE)

Refresh on:

IMDatE project drivers



1. To integrate existing maritime services (LRIT, SSN, CSN, THETIS) to fully exploit their cross-platform capabilities.
2. To develop value added services – on top of the integrated framework.
3. To have a more flexible means to support future services.

Refresh: IMDatE Project Drivers

1. Technical Framework for :

- Improved internal and external data exchange
- Increased flexibility - easy to add and modify maritime business logic and delivery of new services/features.
- Moving towards a Service Oriented Architecture
- Configurable data processing engine -> data fusion, correlation, enrichment, monitoring engine, alerting.

2. EMSA wide architecture - Data Rationalisation (Definition of application & enterprise level data, reduction of duplications and inconsistencies, standardised/canonical internal formats, storage approach, etc.)

3. Development and deployment of a **Satellite AIS Data Processing Centre**

4. Deployment of new **Value Added Services** – Automated Monitoring, Integrated Ship Profile, Area Centric Service etc...

Customisation – What does it bring?

- Faster: to deliver new (pilot) services. Key processes can now be set-up by configuration
 - Order of time from *months to weeks*.
- Cheaper: less dependence on external contractors. Improved rationalisation among multiple applications. Improved platform extensibility.
- Improved: new integrated services. New services deployed easily.

1. Capabilities:

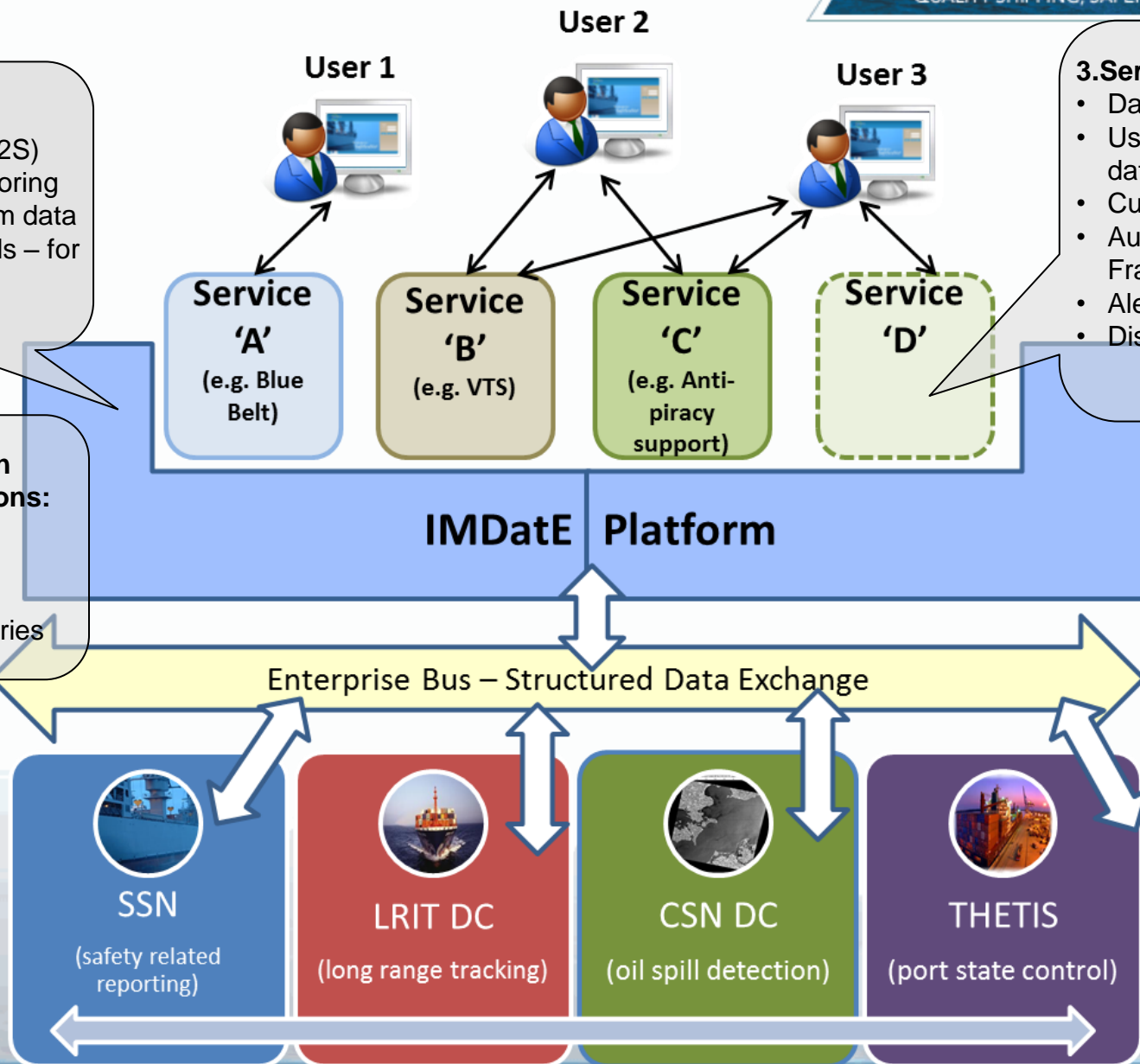
- Data fusion
- Dissemination (S2S)
- Automated monitoring
- Addition of custom data
- New analysis tools – for combined data
- Satellite AIS

2. Rationalisation among applications:

- Single Sign-On
- Common user management
- Common registries

3. Service Configuration:

- Data feeds (AIS, LRIT..)
- User/community-specific data
- Custom visualisation
- Automated Monitoring Framework
- Alerting means
- Dissemination format



Customisation process - User Data and Display

1. **Selection of the core data/services** available at EMSA and seen by the user.
 - Position reports : AIS, S-AIS, LRIT etc.
 - Voyage and cargo information
 - PSC information
 - Satellite products (images, VDS, and oil spill)
2. **Addition of user specific data**
 - E.g. Additional AIS **position report** feeds, VMS or coastal radar.
 - Specific **ship particulars** not available through EMSA ship database (RVR) but necessary for specific monitoring.
 - Geo-referenced events e.g. vessel sightings, pollution detection, known infringements.
3. **Configure display symbols and panel content.**

**User specific data is only seen by the users who are granted access to it.*

IMDatE - out-of-the-box features (1 of 2)

Data Processing:

- **Live picture of last known vessel positions**
 - From multi-source data (AIS, LRIT, S-AIS etc)
 - Multi-criteria vessel search
- **Ship track creation**
 - Track association
 - Track interpolation and prediction
 - History of vessel voyage
- **Position reporting correctness checks** - Kalman filter processing
- **Easy addition of new data** – e.g. surrounding AIS positions received by patrol vessels, on-scene incident reports etc
- **Validation** - against complete EMSA vessel registry -operational databases
- **Correlation:**
 - Automated correlation of VDS from SAR images with position reports.
 - Enrichment of position reports with data from multiple databases
- **Display of satellite images** (SAR and optical) and overlay of ship tracks.
- **Handling of 'incident' information** – inspections/sightings/events.
- **Handling of reported voyage information** – next port of call, last port etc.

IMDatE - out-of-the-box features (2 of 2)

Automated behaviour monitoring and alerts:

- **Monitoring engine**
- **Comprehensive and expandable set of automated monitoring functions.**
 - E.g vessel entered/exited a defined area
 - Detection of at-sea-encounter between two vessels.
 - Vessel deviated from expected and reported route.
 - Vessel not reporting or under-reporting.
- **Choose between receiving emails, PDF reports, XML messages.**

Supporting Tools:

- **Aggregation - Single request to have ALL available information on a vessel from different EMSA applications**
- **Area Centric Query**
 - All available information in a given area – ship tracks, incidents, satellite images, non-correlated VDS....
- **Graphical interface with tailored symbols, filtering of data, user specific data.**
- **Overlay of community specific data using WMS/WFS web services**

System-to-System interfaces:

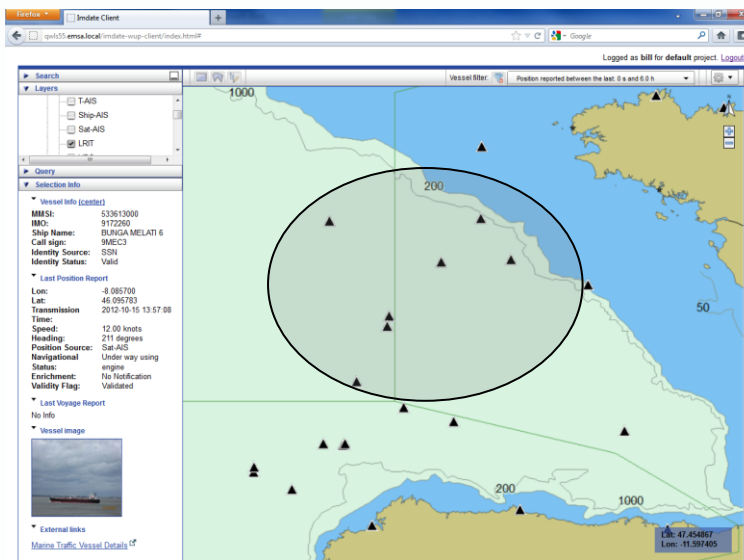
- **Position dissemination facility**
- **New XML interfaces**

Additional Integration Activities

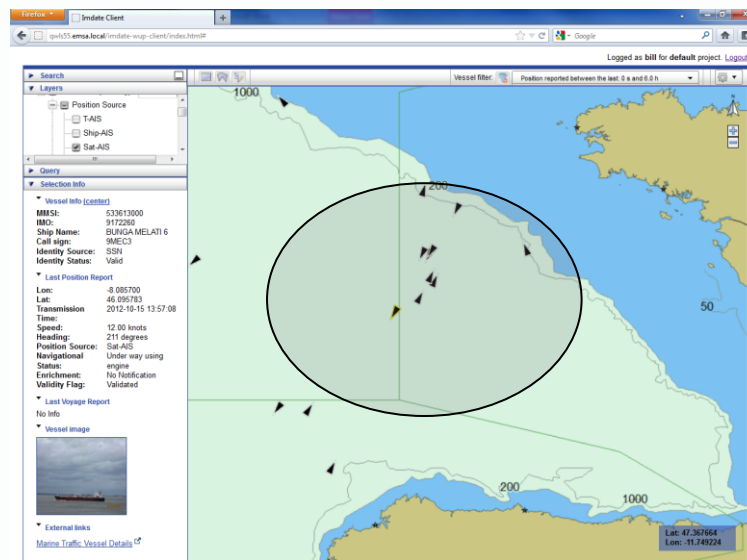
1. Adoption of the **Single Sign-On (SSO)** solution and central user registry for all maritime applications
2. Promotion of **common geo-registries**
 - Single repository. RVR is an example of one. Locode registry is another.
3. New **supporting ICT tools** at EMSA e.g. Enterprise Service Bus
 - Make applications more robust to change
 - Promote cost reduction
4. **New integrated services** that may be used by the other applications or directly by the Member States. e.g. vessel track query, on-demand automated monitoring.

- ❑ **A single platform**, all on **one graphical interface**
- ❑ **Last known vessel position** view with **multiple data sources**:
 - AIS + LRIT + S-AIS + VMS + coastal radar + satellite radar
- ❑ Now position reports can be **systematically subjected to validation/data checks**:
 - Validation of between reports from the same source (e.g AIS).
 - Validation of reports **between different sensor sources** (e.g AIS and LRIT).
- ❑ Real-time **generation of ship tracks**:
 - based on single source of position reports
 - based on multiple types of position reports.
- ❑ **Correlation** of satellite radar and coastal radar detected vessels with other position report sources to establish identified/non-identified vessels.

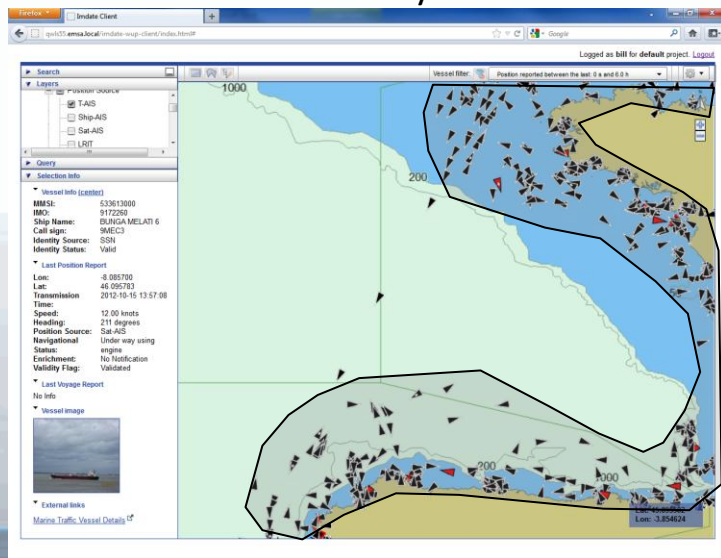
LRIT only



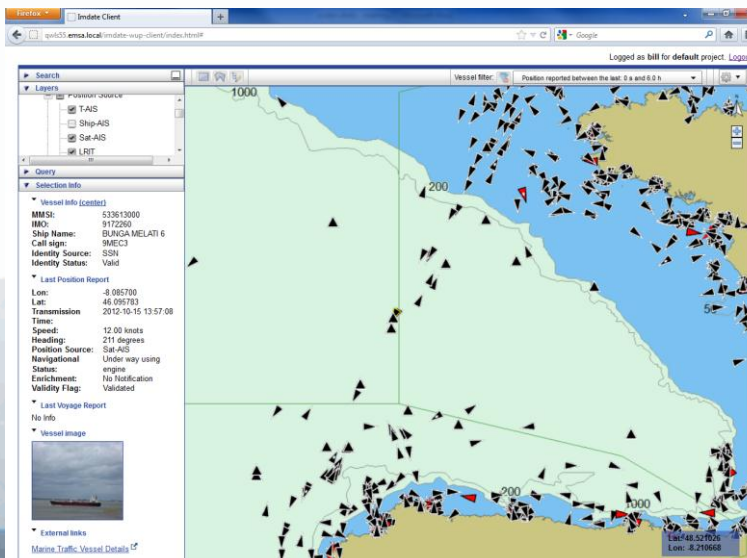
S-AIS only



AIS only



AIS+S-AIS+LRIT



Data fusion: Kalman filter - Use of Ship type

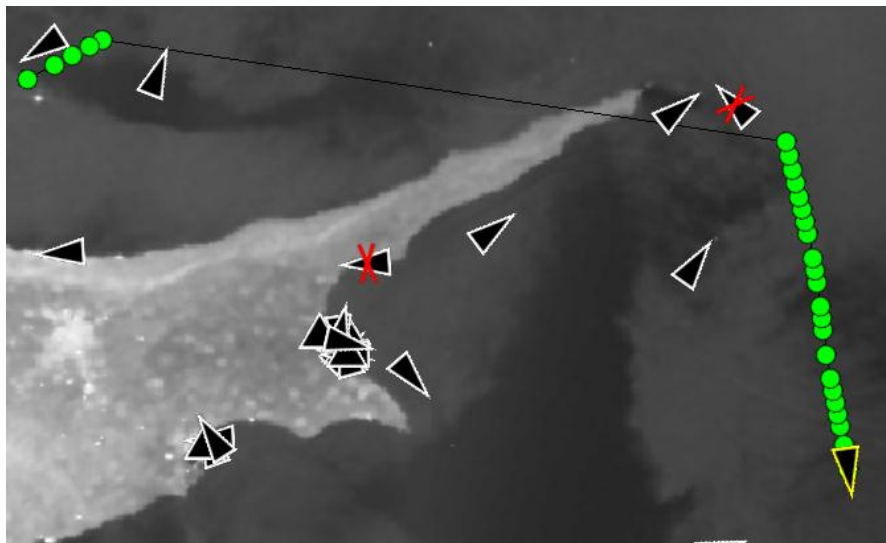


Tanker parameters



Highspeed craft parameters

Data Fusion: in case of data gaps



AIS and S-AIS reports with track interpolation

Get vessel track

Vessel: MMSI 352879000

Begin Date: 2012-02-12T00:00:00Z

End Date: 2012-02-15T11:00:00Z

Advanced options:

Sources: ALL

Kalman Filtering:

☒ Fuse and smooth

☐ Extrapolate

Extrapolation duration (min): 30

Step (s): 60

Submit

Selection Info

Flag: PANAMA

Call sign: 3EAG4

Ship type: Other Type, all ships of this type (90)

Length: 199 m

Identity Source: AIS TYPE 5

Identity Status: Valid

Last Position Report

Lon: 016°29'08"E

Lat: 35°10'08"N

Transmission Time: 2012-02-15T10:17:55Z

Speed: 15.90 knots

Heading: 106°


Position Source: Sat-AIS

Destination: N/A

Navigation Status: N/A

Validity Flag: Validated


Enrichment: No Notification



Marine Traffic Vessel Details

Interpolation considers:

- Previous position reports
- Heading and speed
- Correctness thresholds



Vessel Tracks

Number of tracks: 1 Total track points: 5068

MMSI	IMO	IR	Sh
352879000	9284776	N/A	CP

Number of positions: 5068

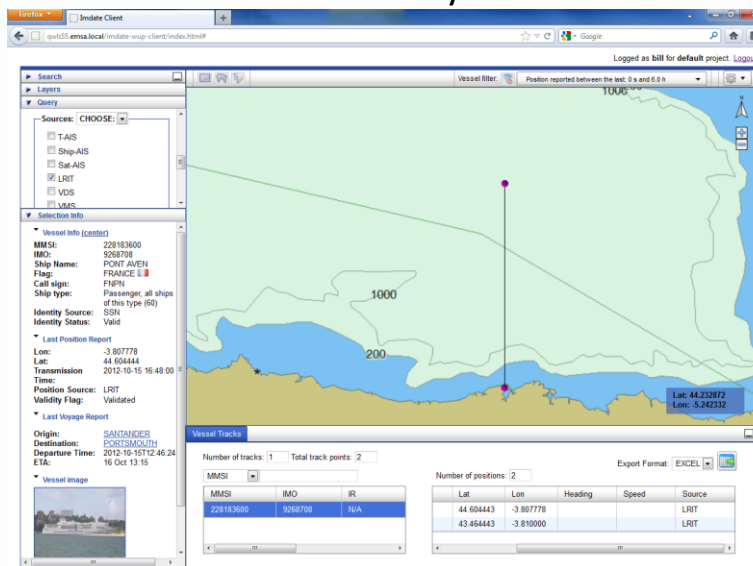
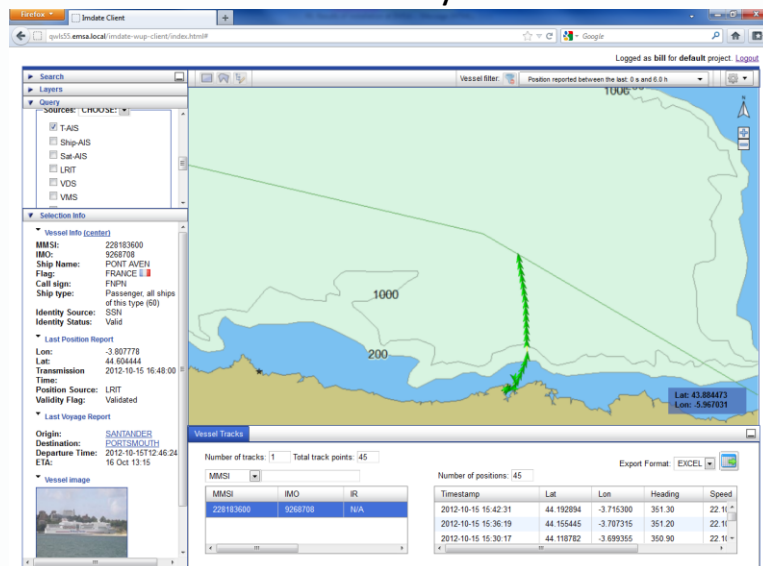
Export Format: EXCEL

Timestamp	Lat	Lon	Heading	Speed
2012-02-13T04:05:03Z	36.52	-0.73	80.44	7.41
2012-02-13T04:04:03Z	36.52	-0.74	80.25	7.60
2012-02-13T04:03:03Z	36.52	-0.74	80.02	8.15
2012-02-13T04:02:03Z	36.52	-0.75	79.77	9.08

<< first < prev 29 30 31 32 33 34 35 36 37 38 next > last >>

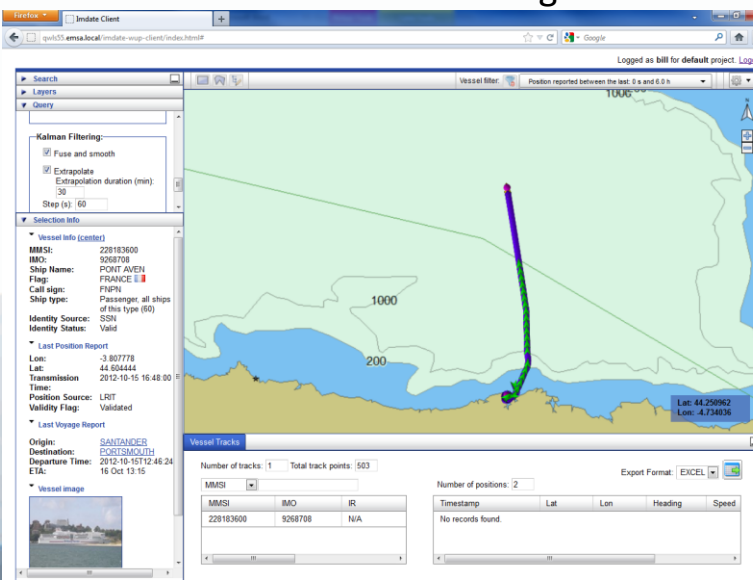
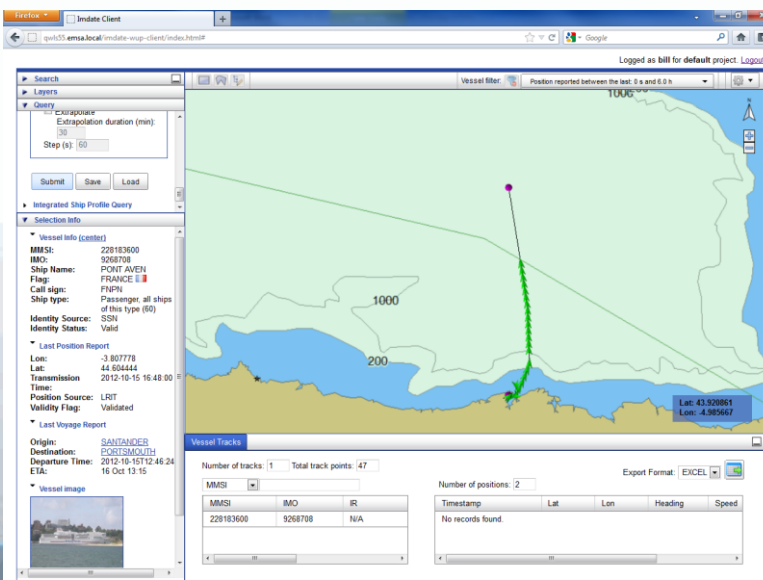
AIS only

LRIT only



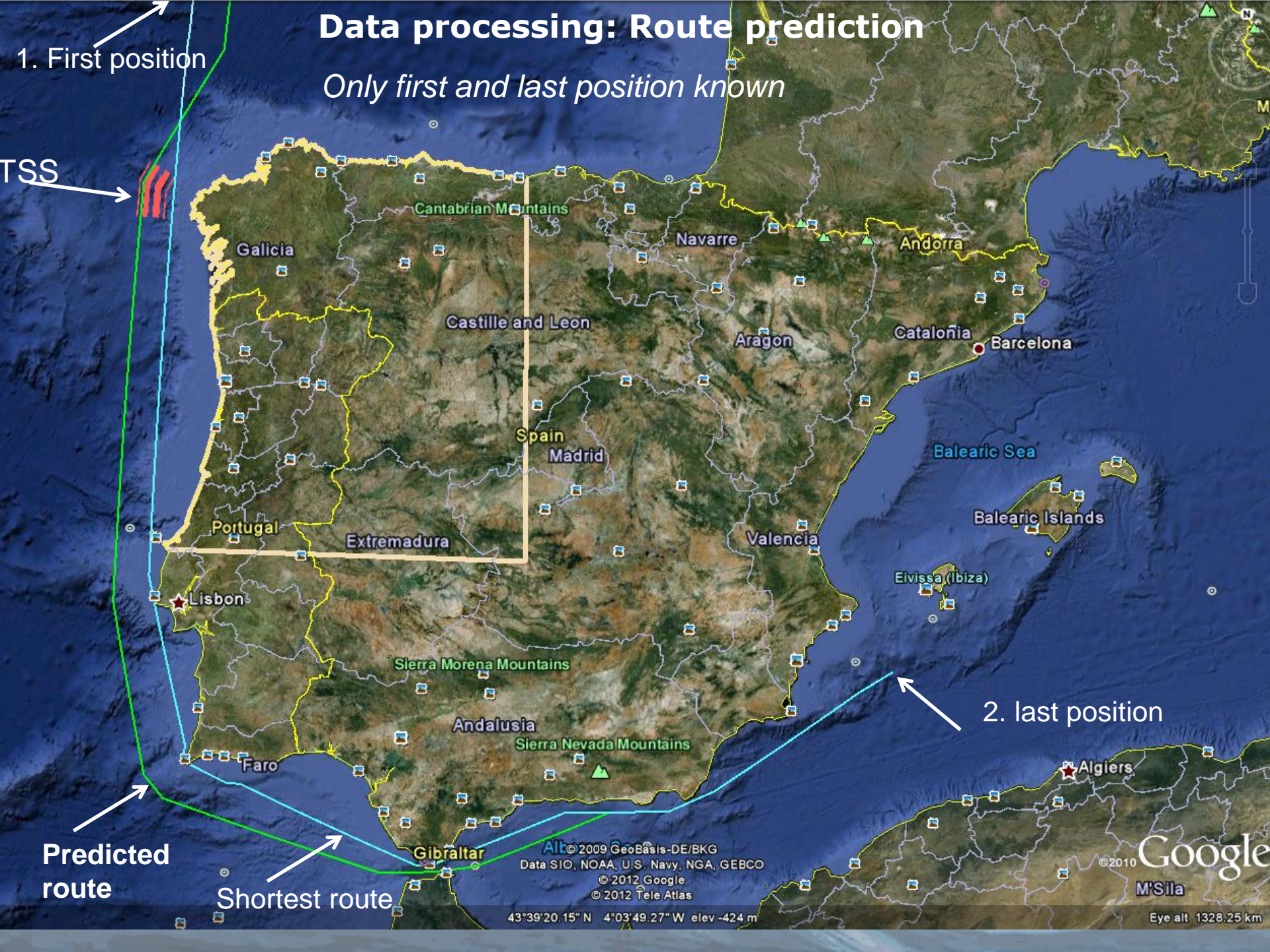
AIS+LRIT

AIS+LRIT+Smoothing

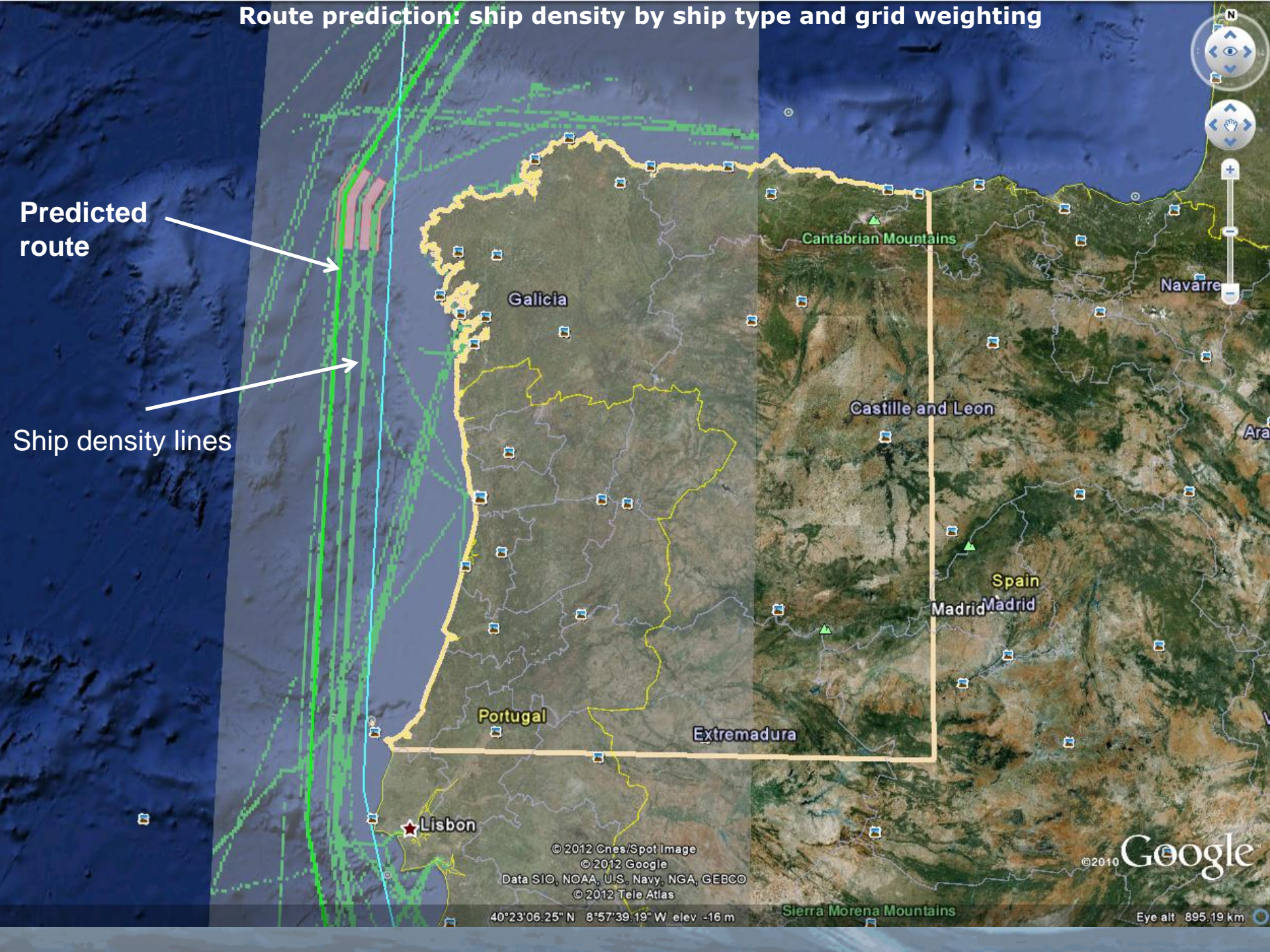


Data processing: Route prediction

Only first and last position known



Route prediction: ship density by ship type and grid weighting

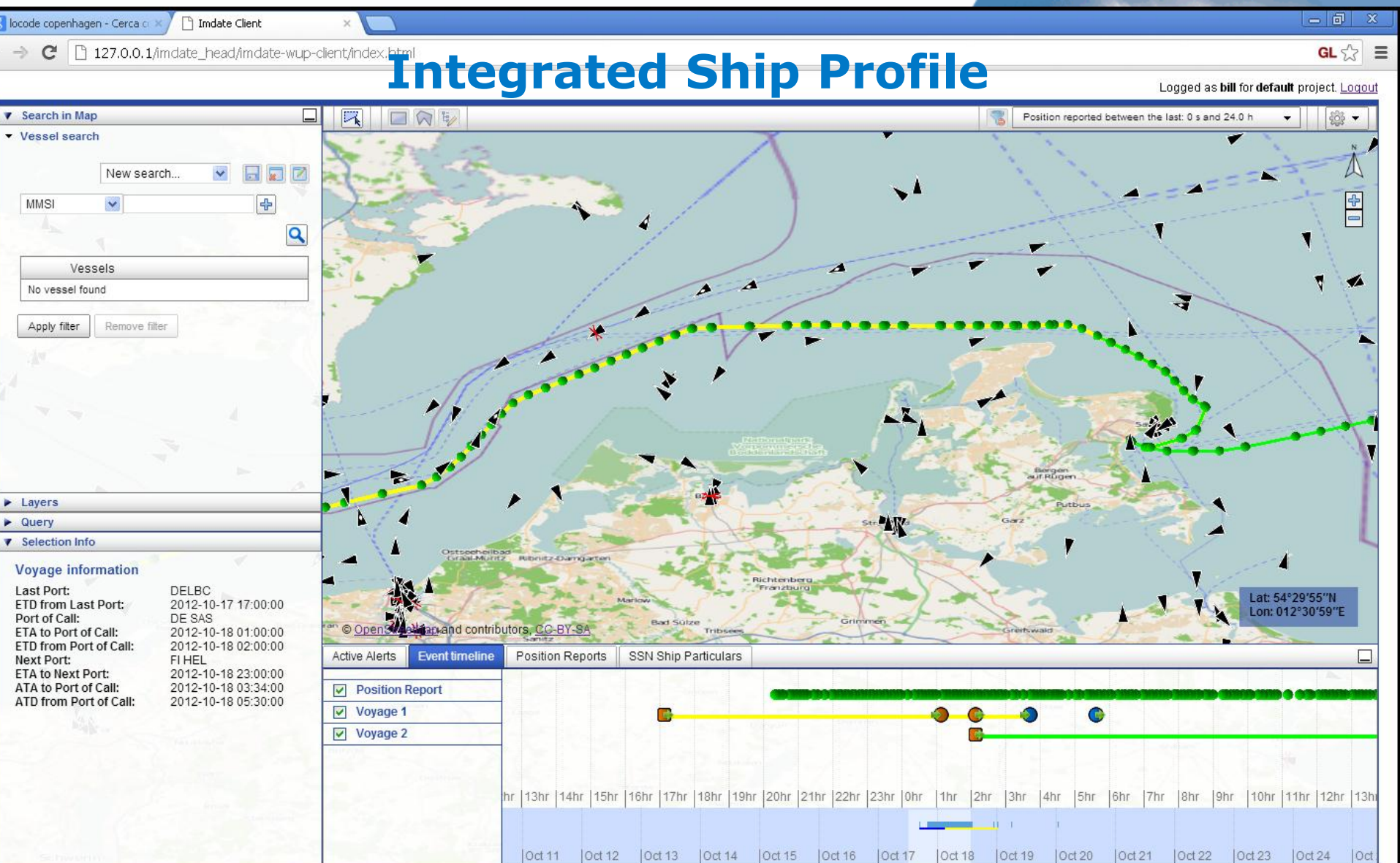


Predicted route

Ship density lines

Combining maritime data – second level

- *Integrated Ship Profile*
 - A single operation to aggregate information on a vessel from all EMSA applications.
 - SSN notifications, THETIS - SRP, Priority of inspection etc.
 - A 'Timeline' tool to provide better awareness of temporal events and information.
- *Area Centric*
 - Any position related information and ship tracks
 - Overlay of satellite images
 - Correlation for satellite detected vessels (VDS)
 - Checking detected vessel position against position reports.
 - External information layers (oceanographic and meteorological information, ad-hoc external information sources)



In addition to the map view, a 'Timeline' tool provides better awareness of time related events/information. Clicking on an element in the timeline refocusses on the relevant part of the map.

locode copenhagen - Cerca c... Imdate Client

127.0.0.1/imdate_head/imdate-wup-client/index.html

Logged as **bill** for **default** project. [Logout](#)

Search in Map

Vessel search

New search...

MMSI

Vessels

No vessel found

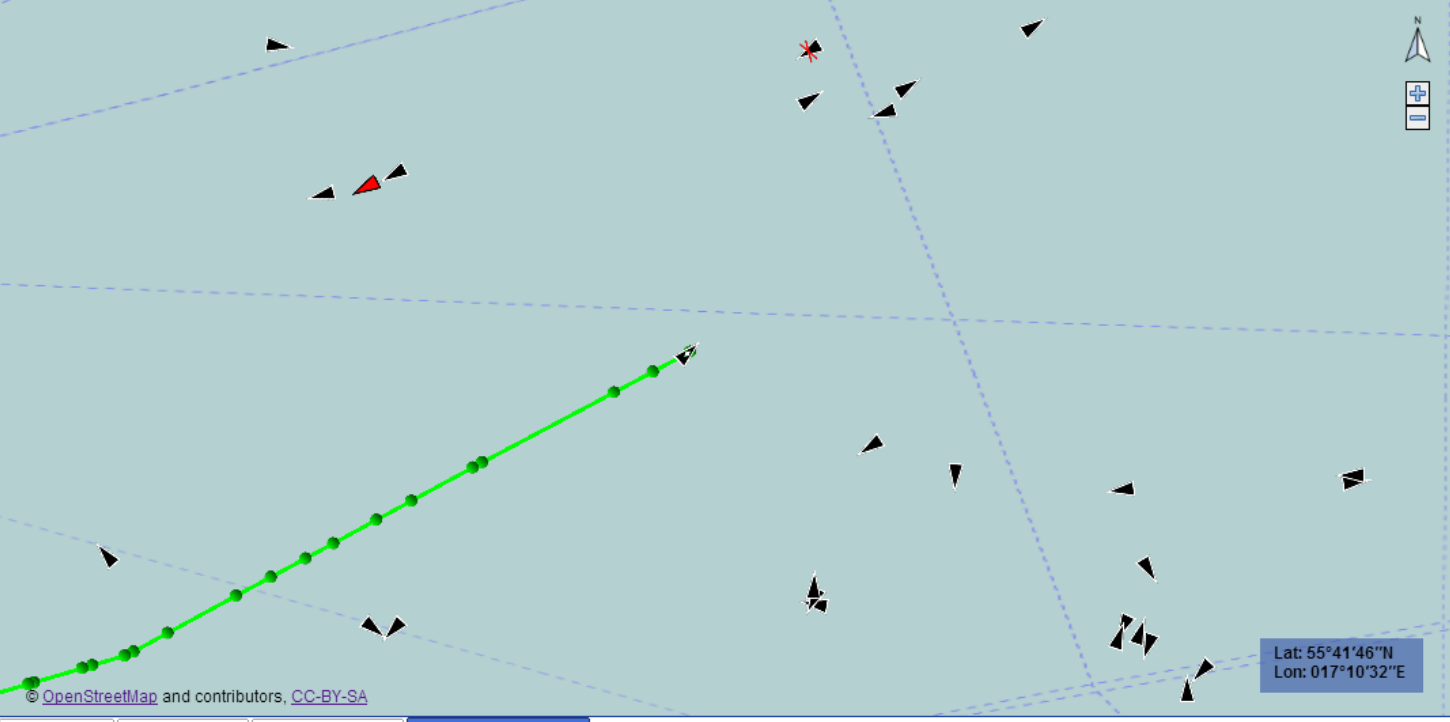
Apply filter Remove filter

Layers

Query

Selection Info

No item selected




Position reported between the last: 0 s and 24.0 h

Lat: 55°41'46"N
Lon: 017°10'32"E

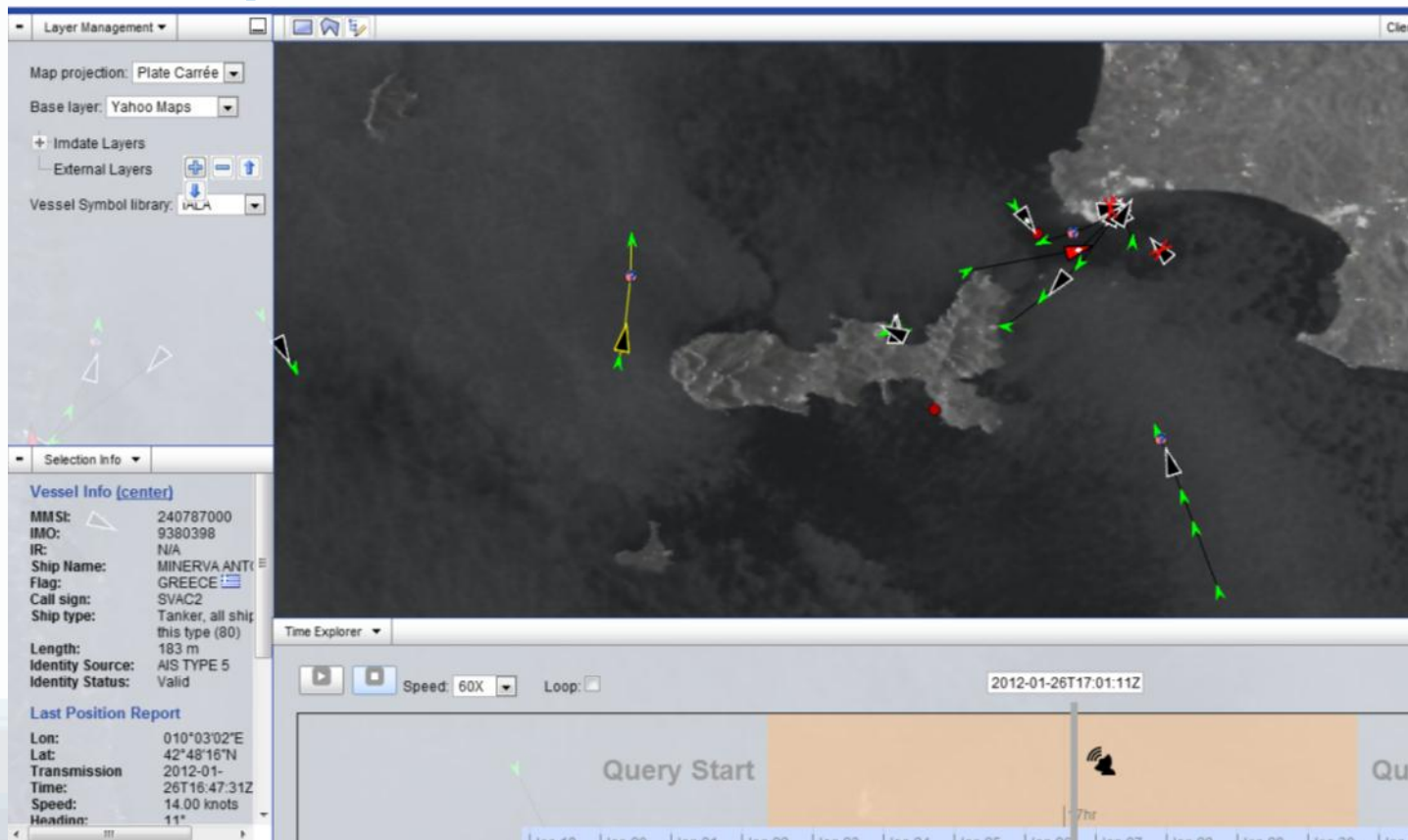
© OpenStreetMap and contributors, CC-BY-SA

Active Alerts Event timeline Position Reports **SSN Ship Particulars**

Vessel Identification		Vessel Information		Current Vessel Status	
IMO:	9010163	Gross Tonnage:	32534 t	Inspection Priority:	0
MMSI:	266262000	Dead weight:	11558 t	Banned:	0
Ship Name:	FINNPARTNER	Length:	183 m	Detained:	0
Call Sign:	SKIH	Ship type (AIS):	69	Elegible for Banning:	0
Flag:	SE 	Ship type (LMIU):	1	Elegible for Esp Inp:	0
		Ship type (PSC):	1	Single Hull:	0
				Risk Profile:	0
				Service Indicator:	0

THETIS co-display

Correlation between satellite detected vessels and ship position reports



A graphical interface may provide “time slider” visualization for correlation inspection

Monitoring Framework

- A *plug-in* framework for new automated monitoring algorithms
- Authorised users may create automated monitoring instances based on templates, using a wizard, and by defining the rules and specific conditions.
- Data driven– triggered based on specific criteria of:
 - Area of Interest (AoI)
 - Vessels of Interest (VoI)
 - Event of Interest (EoI)

Initial Monitoring Algorithms

- Vessel Entering or Leaving Area
- At sea encounter – 2 vessels
- Drastic change in ETA
- Vessel - Off track considering reported voyage
- Under/over reporting
- Sudden change of speed
- Sudden change of heading
- Sudden change of port of destination
- Check if vessel is anchored.

Search:

Create

Update

Delete

Start

Stop

Template	Status	Description	AOI	V	T
Detect suspicious vessels	running	Detect and analyse suspicious vessels in Strait	Strait	Z	1
Detect suspicious vessels	stopped	Analyse suspicious vessels close Brest coasts	Brest	Z	2

<< Prev
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Next >>

...

Template:

Surveillance parameters

Form is built on the fly according the selected surveillance template

Alert notification

Notification: ☒ E-mail ☐ SMS ☐ Fax

Recipients:

User 1

User 2

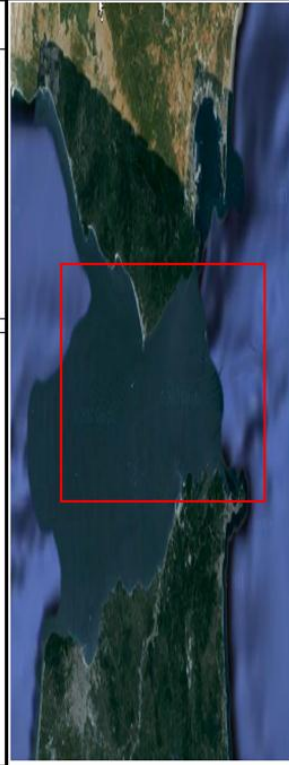
Add user ...

Remove user

Template report:

Cancel

Save



Imdate Client

127.0.0.1/imdate_head/imdate-wup-client/index.html#

Logged as bill for default project. [Logout](#)

Position reported between the last: 0 s and 24.0 h

Search in Map

Vessel search

New search...

MMSI

Vessels

No vessel found

Apply filter Remove filter

Layers

Query

Selection Info

No item selected

Route Check Alert ALR_04

Type: Route Check
Timestamp: 2012-10-17 03:00:00
Lon: 003°10'48"W
Lat: 50°17'24"N
Description: Alert description

Rendezvous Alert ALR_01

Type: Rendezvous
Timestamp: 2012-10-18 06:47:00
Lon: 000°40'48"W
Lat: 49°43'16"N
Description: Rendezvous between two vessels
Involved Vessels: [F/V PERE DANIEL](#)
[FVL EUROPE](#)

Reserved Zone Entry Alert ALR_02

Type: Reserved Zone Entry
Timestamp: 2012-10-16 22:00:00
Lon: 001°43'48"W
Lat: 49°10'12"N
Description: Vessel entered in reserved zone

Lat: 50°43'08"N
Lon: 002°45'55"W

Active Alerts

Total records: 3

ID	Type	Lat	Lon	Timestamp
ALR_01	Rendezvous	49.721	-0.68	2012-10-18 06:47:00
ALR_02	Reserved Zone Entry	49.17	-1.73	2012-10-16 22:00:00
ALR_04	Route Check	50.29	-3.18	2012-10-17 03:00:00

By clicking on the ship name, the display alert automatically pop up with the map as the current position of the ship to which it refers to.

Imdate Client

127.0.0.1/imdate_head/imdate-wup-client/index.html#

Logged as **bill** for **default** project. [Logout](#)

Position reported between the last: 0 s and 24.0 h

Search in Map

Vessel search

New search...

MMSI

Area Centric Query

Area

Lat: 49° 43' 16" N

Lon: 0° 40' 48" W +/- 10 Nm

Time

2012-10-18 06:47:00 +/- 2 h 0 min

Service options:

☒ Vessel Tracks

Position sources: ALL

☐ Uncorrelated Positions

☒ Incidents

Category: All

Type: All

☐ CSN-DC Oil spills

☐ CSN-DC EO Products

Submit **Set as default** **Load default** **Cancel**

Total records: 3

ID	Type	Lat	Lon	Timestamp
ALR_01	Rendezvous	49.721	-0.68	2012-10-18 06:47:00
ALR_02	Reserved Zone Entry	49.17	-1.73	2012-10-16 22:00:00
ALR_04	Route Check	50.29	-3.18	2012-10-17 03:00:00

Lat: 49°48'05"N
Lon: 000°56'20"W

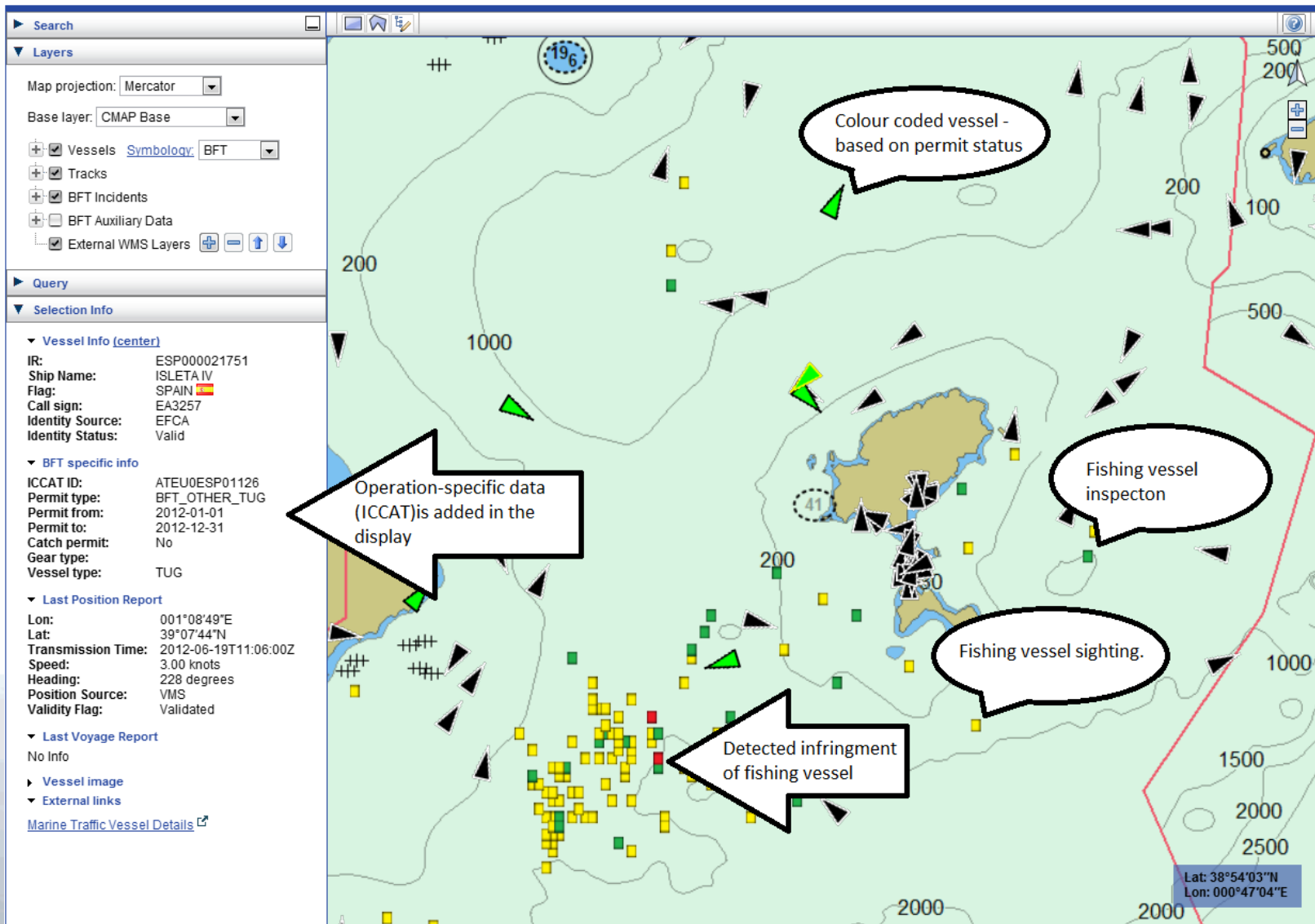
Easily and quickly query all data in an area centred around the position of the alert.

System-to-System Interfaces

- **Position reports – dissemination facility**
 - Subscription to data by:
 - Source (AIS, LRIT, S-AIS etc)
 - Geographic area
 - Time window
 - Different formats and protocols supported.
 - NPR proxy – IEC format
 - IVEF (Inter-VTS Exchange Format)
 - EMSA standard format (CDF)
 - Use of plug-in to extend to new interfaces.
- **Data aggregation interfaces**

XML interface for the Integrated Ship Profile.
- **Alerting:**
 - Email and PDF
 - XML messaging (CAP – Common Alert Protocol)

Example of Graphical Interface customisation





Thank you very much
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