

Looking backward at what happened during a survey: the Eurofleets Automatic Reporting System (EARS)

Bridging the gap between data and metadata (Part 2)

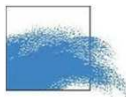


Paolo Diviacco*, Alessandro Busato



Ifremer

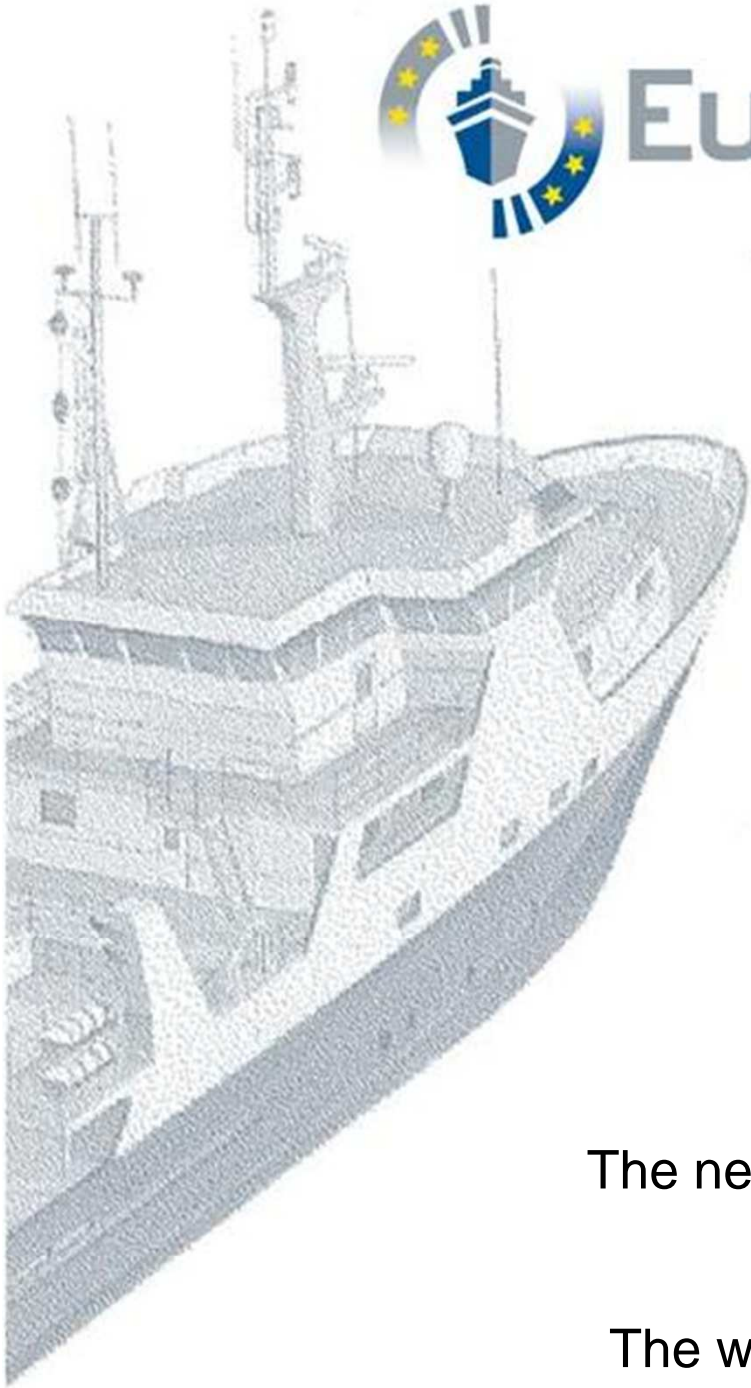
Marie-Paule Corre, Marc Nokin, Jean-Marc Siquin



Karien Decawer, Serge Scory, Yvan Stojanov,

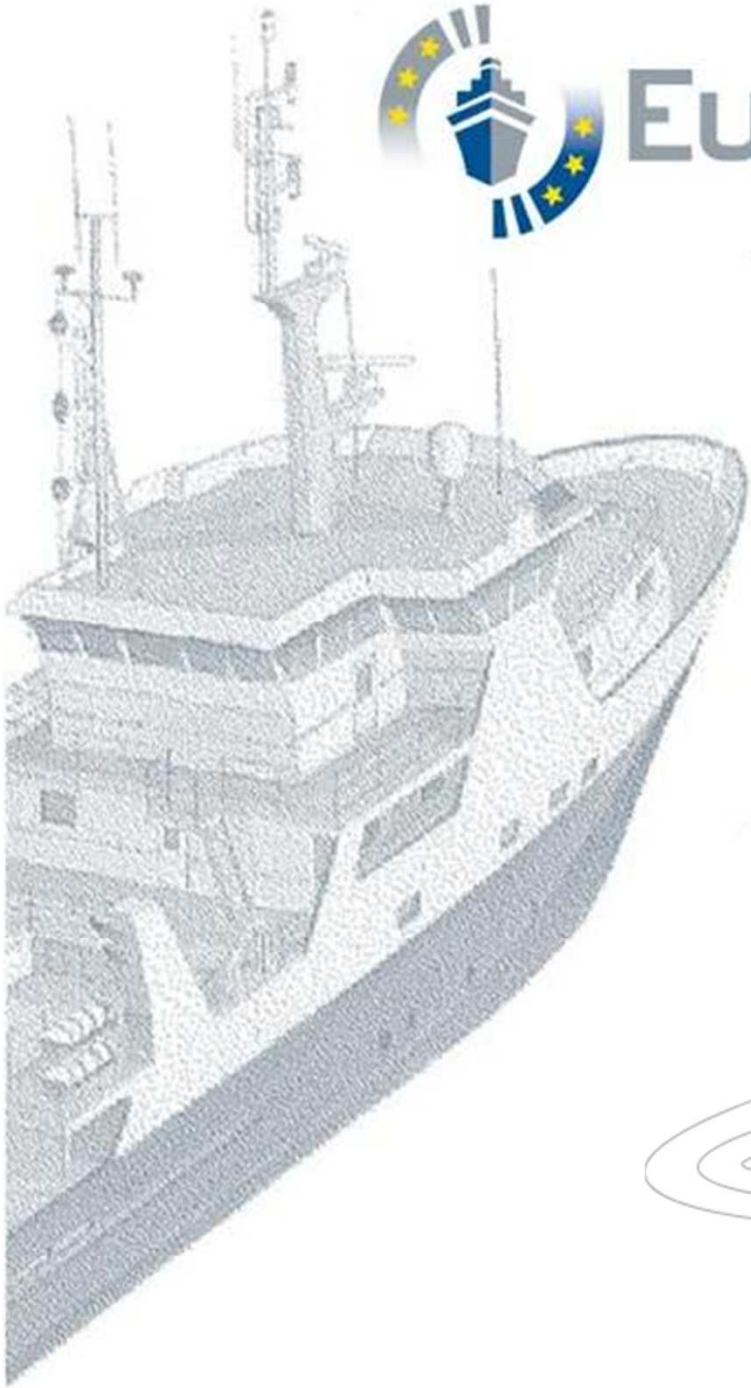


Jordi Sorribas



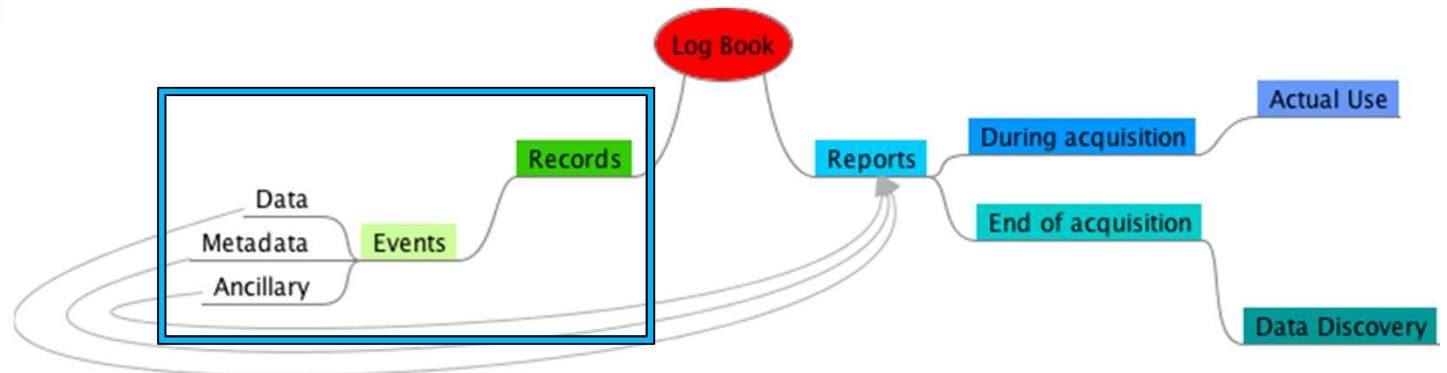
The need of recording what happens during an observation is nothing really new.

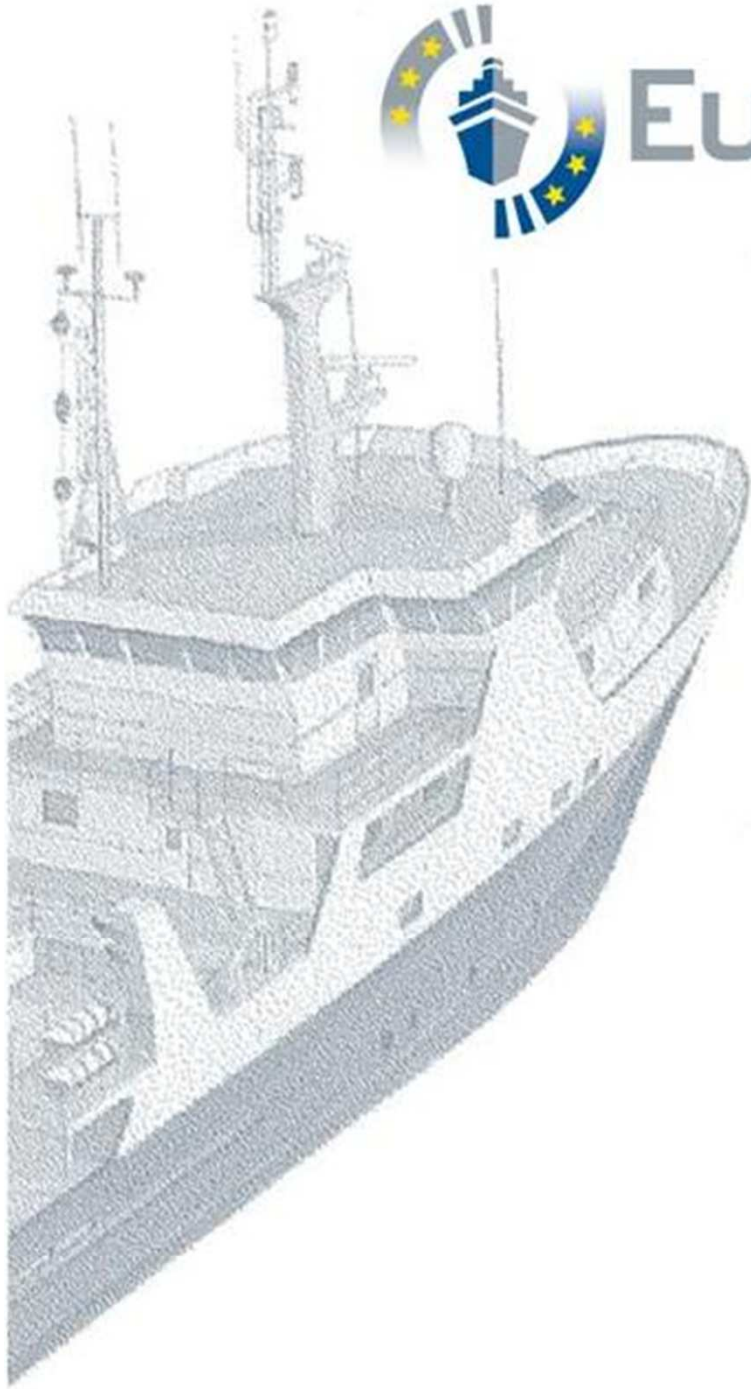
The way this can be done instead is intimately linked with the technology that surrounds us



Mind map of a log book

- Functionalities: Record, reports
- What: data, metadata, “ancillary” information
- Reports can be:
 - Full during the acquisition (usage/ancillary)
 - Summary at the end (needs human intervention) (data discovery)





A log book records events

What is an event?

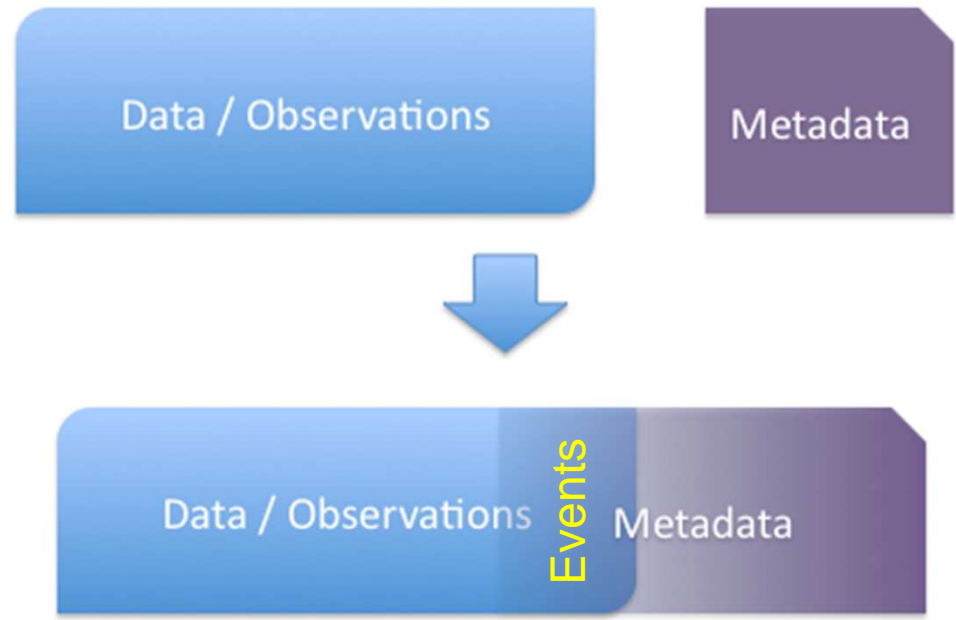
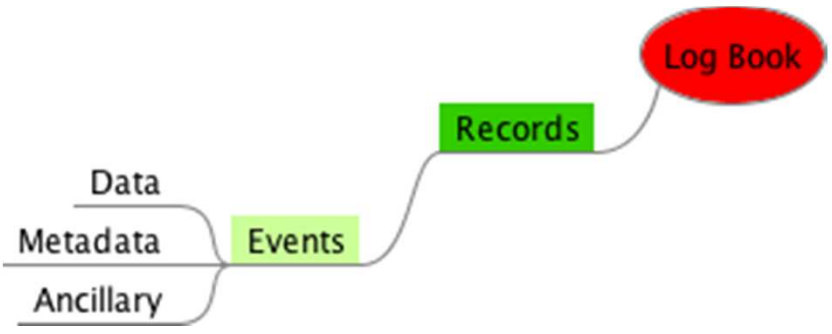
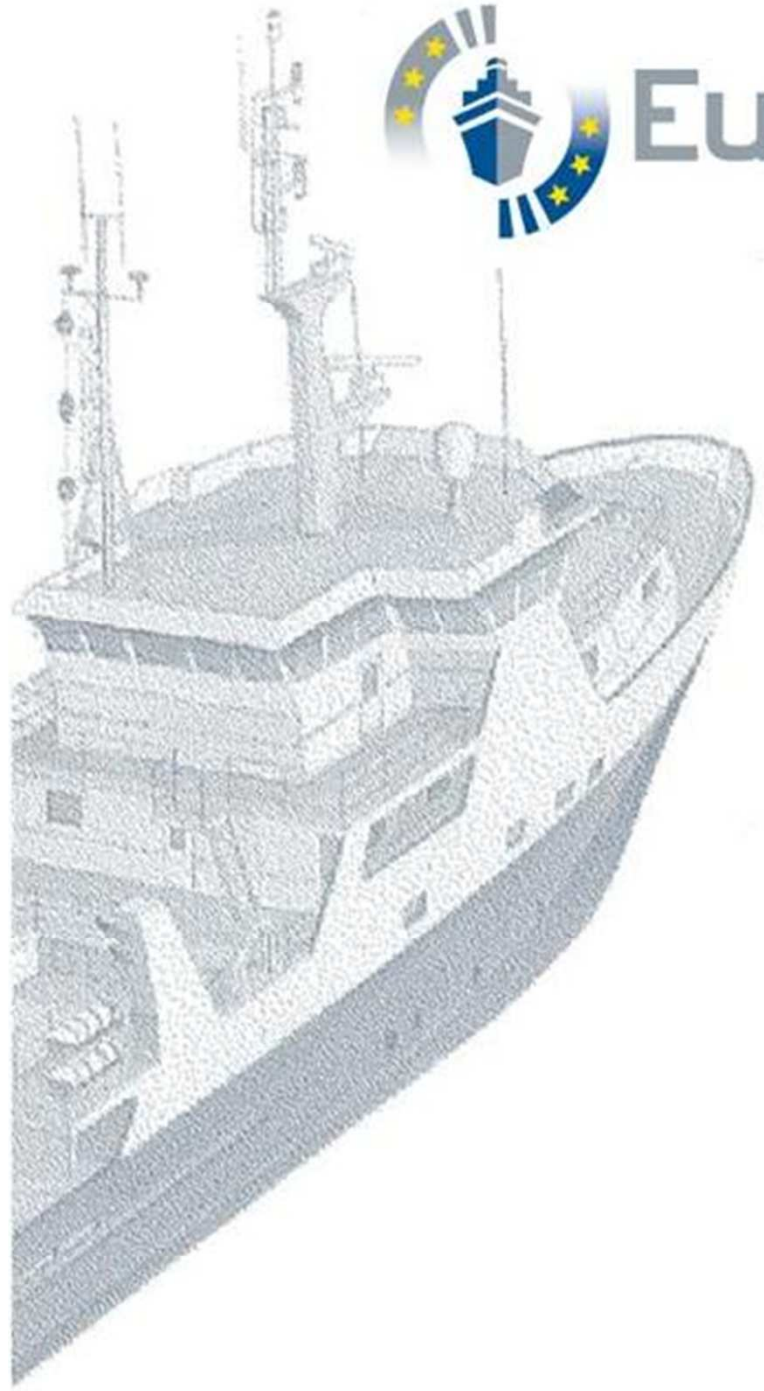
From ex/venire it is something that comes out / emerges on its own.

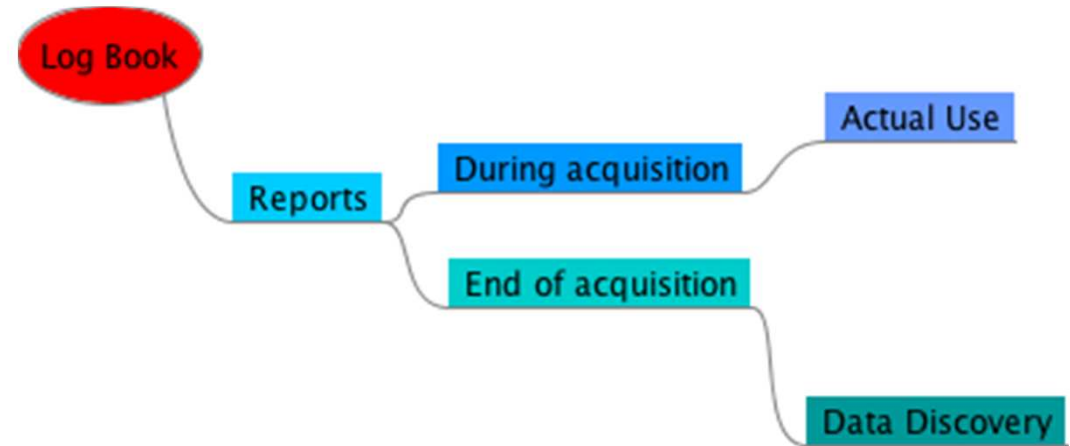
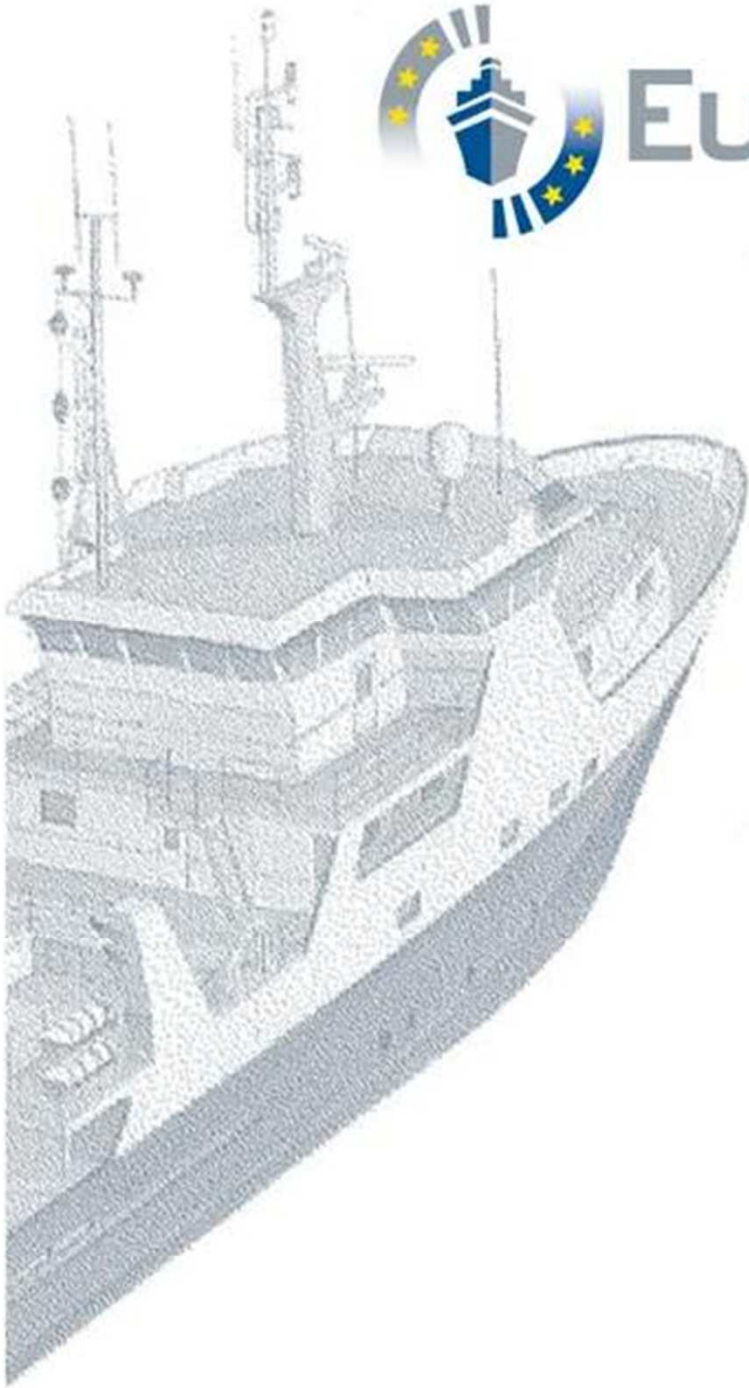
The difference with observations (the experiment a scientist is performing) is that we are not looking “there”

Events can strongly bias observations (swell in high resolution seismics)

Events can be used outside the context in which were recorded as data of another context (for example meteo, underway data)

Events can be used as metadata of the observation (parametrization, positioning, calibration)





Reports gather information about events

Reports can be:

- synchronous (automatic list of all events) (usage es. swell, meteo)
- Ex post (manual summary) (es. CSR, data discovery)

We did not start from scratch (Ifremer CASINO+ sw)

We updated it with

Additions

- Manual event module

- controlled vocabulary

- mikado (SeaDataNet/GeoSeas/CSR) integration

- GeoSeas O&M/SensorML model integration

 - ..see my other poster

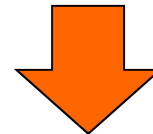
- Structured event model (ontology)

 - ...see Eurofleets other poster

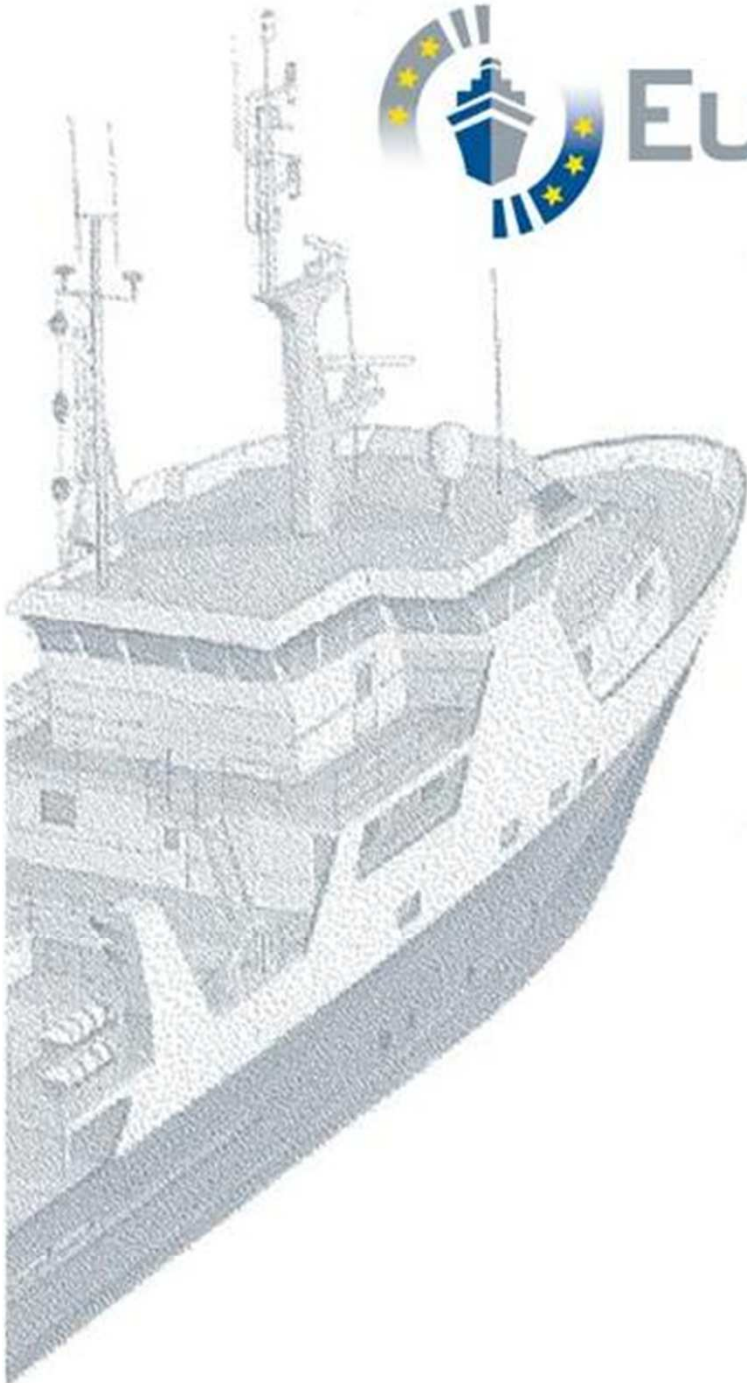
Changes:

- Automatic events GUI

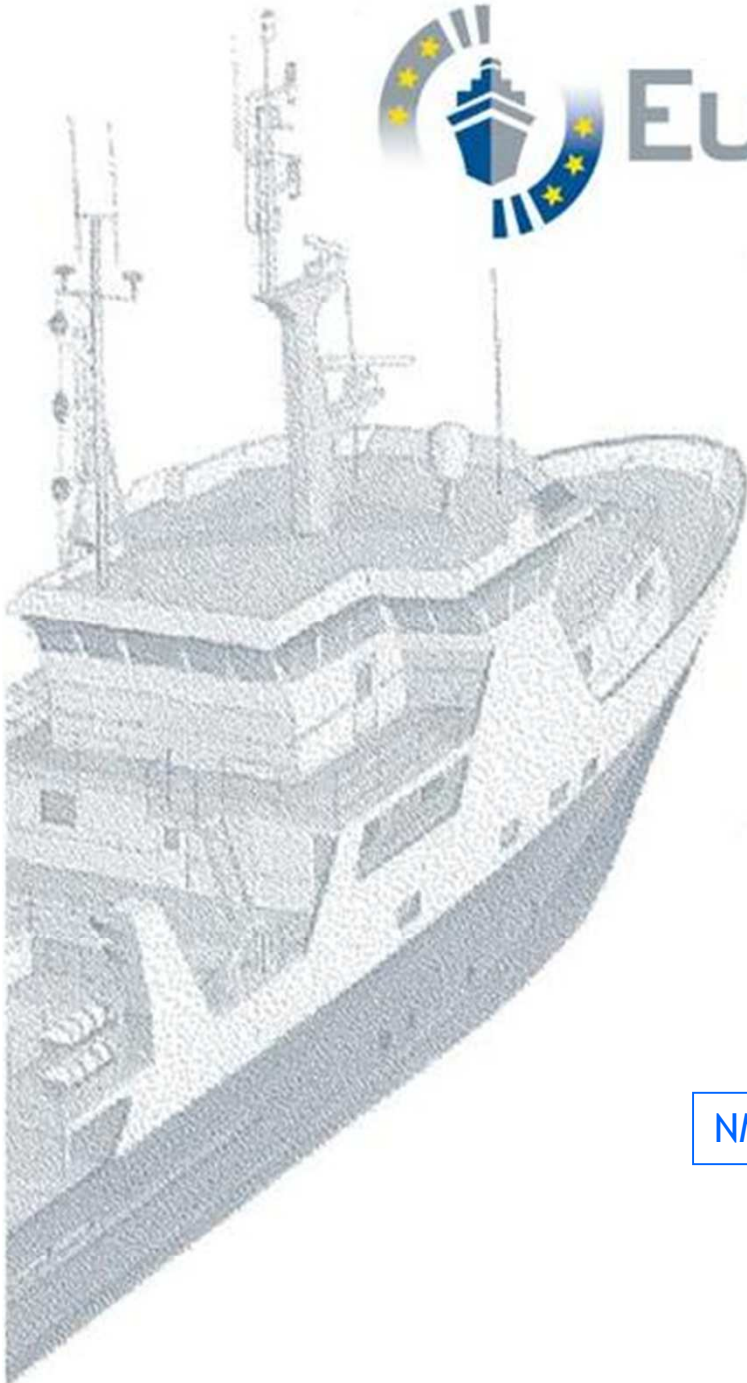
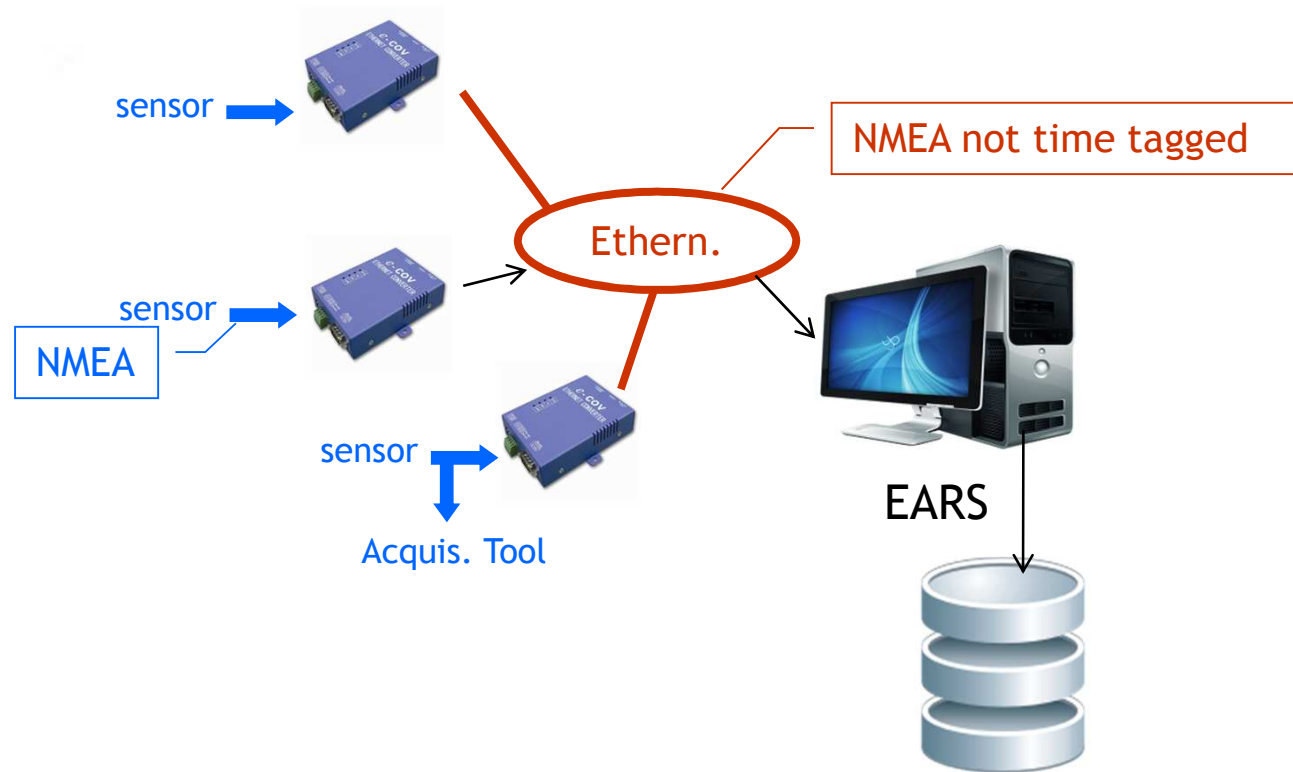
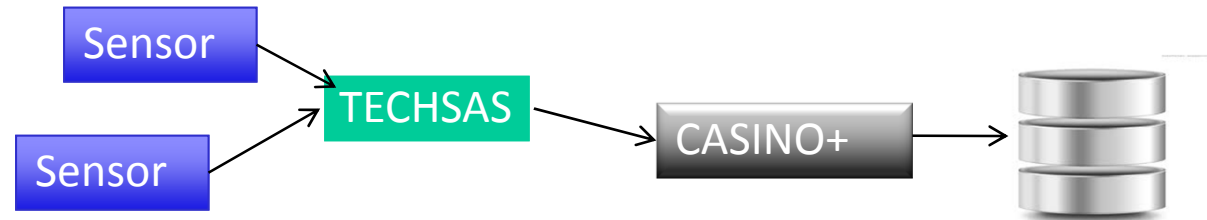
- Hardware abstraction (Techsas)

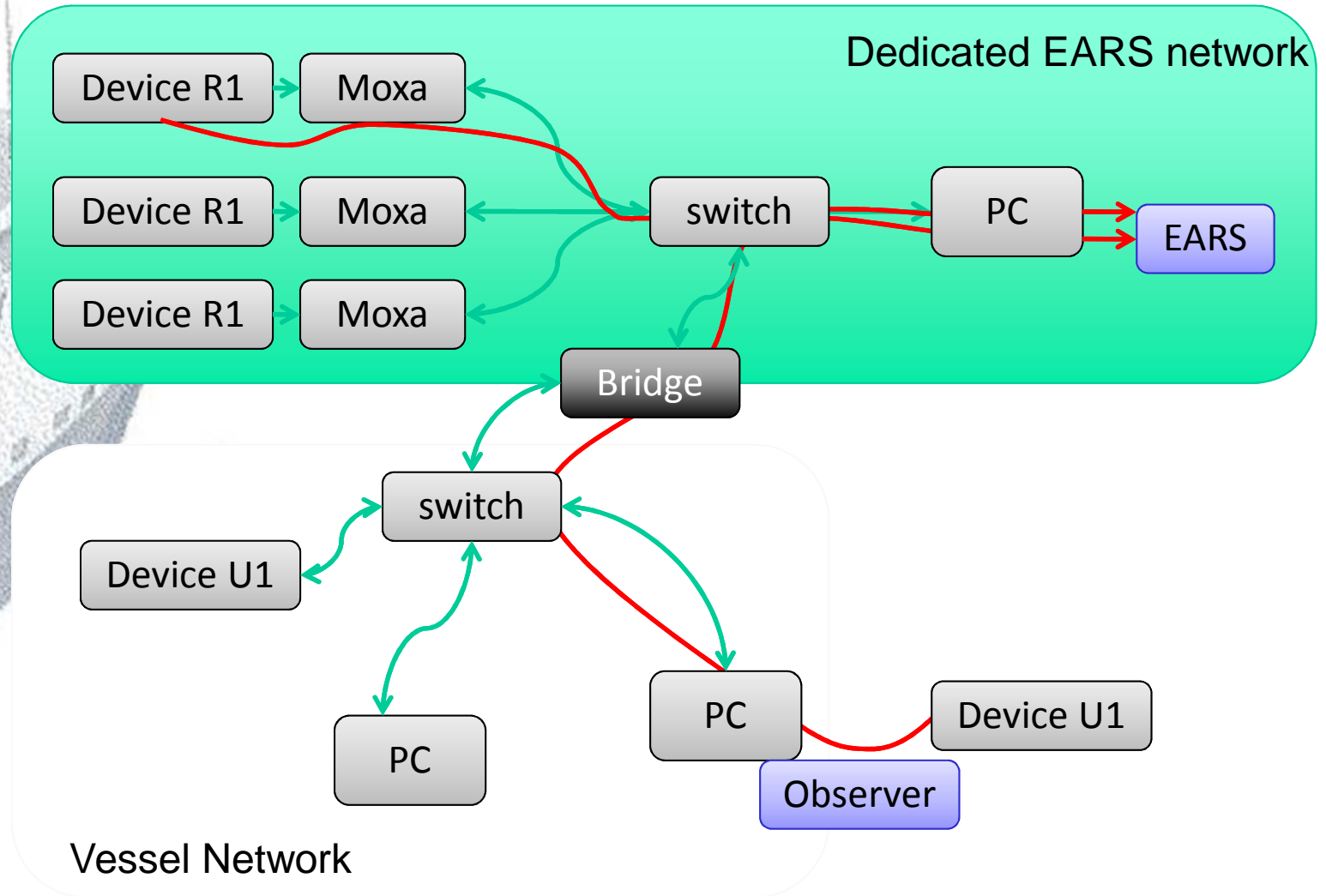


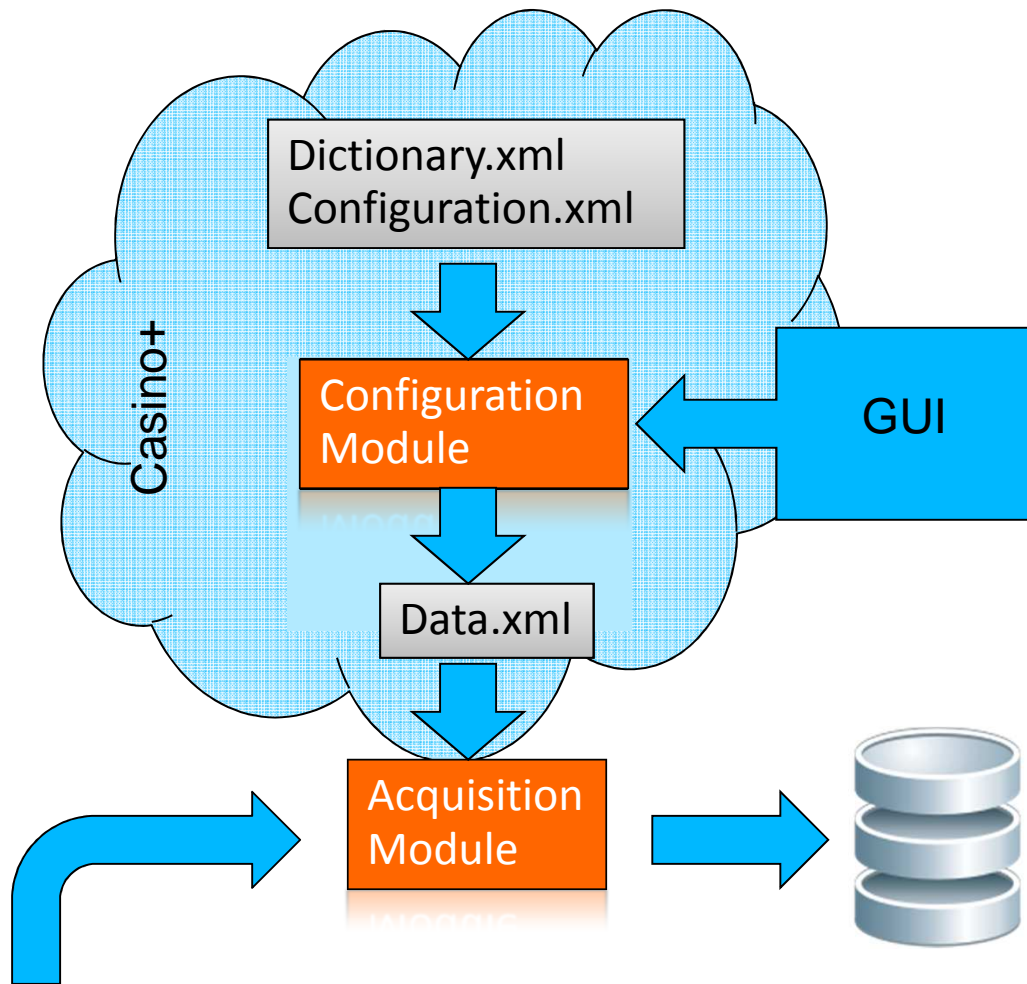
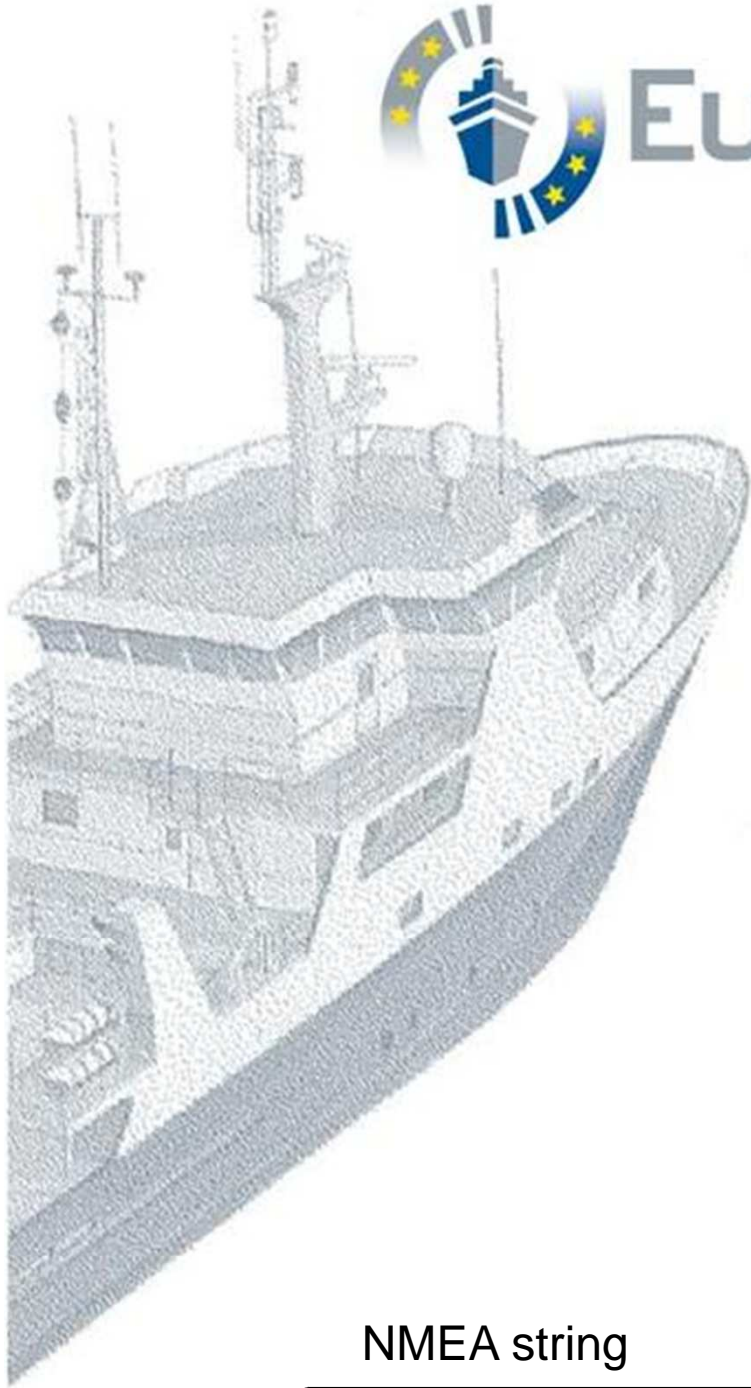
Eurofleets Automatic Reporting System (EARS)



Hardware abstraction (Automatic events)







NMEA string

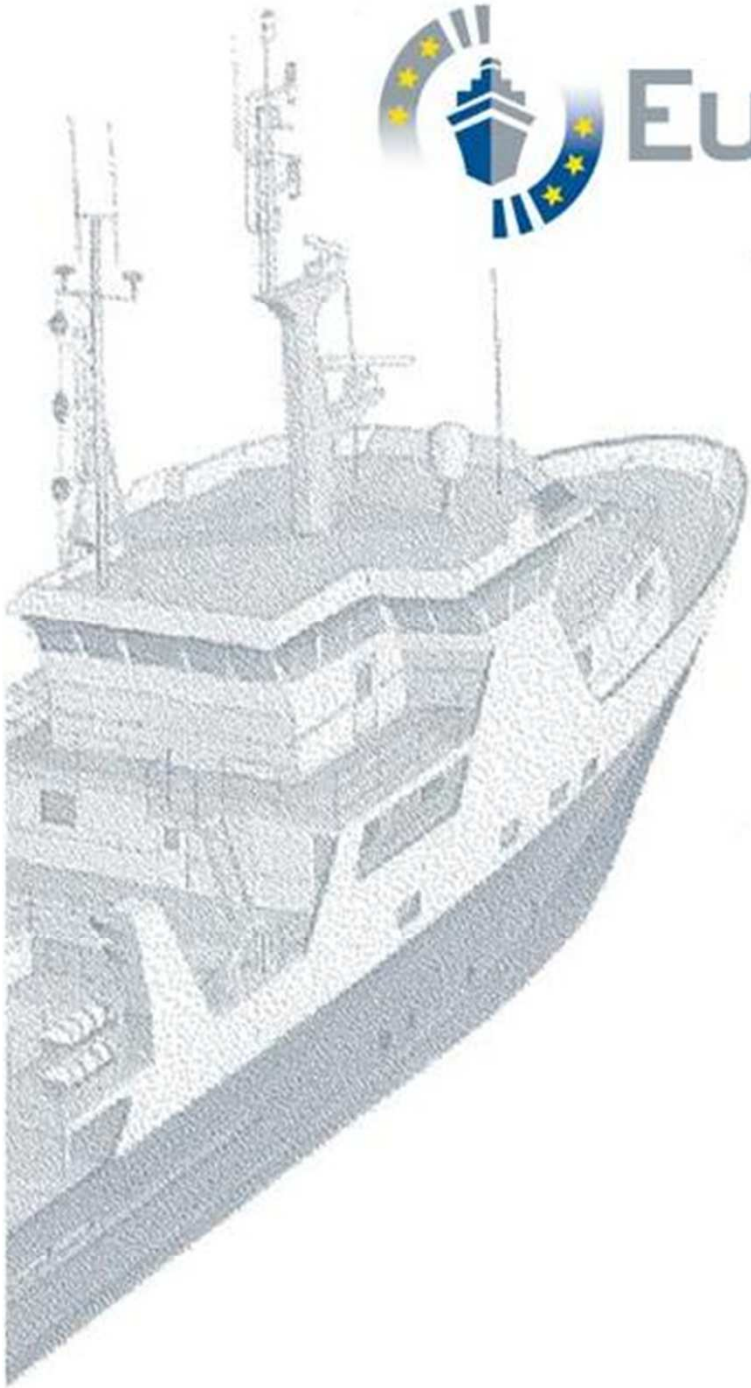
\$GPRMC,183729,A,3907.356,N,12102.482,....

Database

GUI for configuration of NMEA acquisition

Easy way of:

- Edit manually Dictionary
- Edit manually Configuration
- Establish and use catalog of NMEA strings
- Listening to NMEA
- Match NMEA with Instruments (devices)
- Set up dictionary and configuration from NMEA+Instrument matching
- Establish and use catalog of Instruments (devices)



Multicast Port 10512 Service control stop

messages

```
$GPRMC,123519,A,4807.038,N,01131.3000,E...  
$GPRMC,123519,A,4807.038,N,01131.3000,E...  
$GPRMC,123519,A,4807.038,N,01131.3000,E...
```

Close

Listen to NMEA msg.

Catalog of NMEA msg.

Add Remove

Data Type	Reserved	primary
reserve	true	true
reserve	true	true
lat	false	true
long	false	true
reserve	true	true
reserve	true	true
reserve	true	true
reserve	true	true
reserve	true	true

Sentences

Name GPRMC

Description ered by a standard speedometer (loch) or an advanced one (ADCP)

Version

Version Date 2002-03-21 00:00:00

Version Author Fabrice Lefebvre

Version Description initial version

Release

Major 1 Minor 0

Save & Close

Configuration de l'acquisition

Nom	Selec.	Alias	Valeur Manquante	Format	Type	Unité
NAVIGATION						
shipnav						
acquisition time for w	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	5	fraction of days
acquisition time for w	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	5	fraction of days
acquisition time for w	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	5	fraction of days
acquisition time for w	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	5	fraction of days
latitude DMd	<input checked="" type="checkbox"/>	NAVIGATION_shi...	-100	###,####	5	degree north
longitude DMd	<input checked="" type="checkbox"/>	NAVIGATION_shi...	-200	###,####	5	degree east
altitude	<input type="checkbox"/>	NAVIGATION_shi...	-10000000	###,####	5	m
ground speed	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	4	knot
ground course	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	4	degree
surface speed	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	4	knot
surface course	<input type="checkbox"/>	NAVIGATION_shi...	-1	###,####	4	degree
drift speed	<input type="checkbox"/>					
drift course	<input type="checkbox"/>					
true heading	<input type="checkbox"/>					
roll	<input type="checkbox"/>					
pitch	<input type="checkbox"/>					
heave	<input type="checkbox"/>					
depth	<input type="checkbox"/>					
draft	<input type="checkbox"/>					
Gite(degrees)	<input type="checkbox"/>					
Assiette deg.(degrees)	<input type="checkbox"/>					
Assiette cm(cm)	<input type="checkbox"/>					
Acceleration(m/s2)	<input type="checkbox"/>					
Precision	<input type="checkbox"/>					
Origine Pt	<input type="checkbox"/>					
Geoide de ref.	<input type="checkbox"/>					
EtatNav	<input type="checkbox"/>					
Sondeur	<input type="checkbox"/>					
EtatSonde	<input type="checkbox"/>					
MRUS heading	<input type="checkbox"/>					
GPTTEST_MOXA	<input type="checkbox"/>					
NMEA_gptest	<input type="checkbox"/>					
speed (surface)	<input checked="" type="checkbox"/>					

Module d'acquisition de Casino+

Période d'archivage : 30000 ms

Mission en cours : GGGGG

Archivage : En cours...

Données acquises :

Données	valeurs
NAVIGATION_shipnav_lat	-100
NAVIGATION_shipnav_long	200

CASINO+ / Cahier de quart scientifique informatisé

Mission Edition Archivage Communication Affichage Langue Fenêtres ?

Mission : GGGGG Phase : Opération :

Données acquises lors des dernières 24 heures

Date	Latitude(deg. min.milli)	Longitude(deg. min.milli)	Nom Phase	Type De Phase
13/09/2011 09:02:30	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:03:00	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:03:30	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:04:00	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:04:30	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:05:00	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:05:30	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:06:00	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:06:30	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:07:00	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:07:30	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:08:00	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:08:30	N 48° 7,038'	E 11° 31,3'		
13/09/2011 09:09:00	N 48° 7,038'	E 11° 31,3'		

Etat de l'archivage automatique de trames : ● Insertion d'évènements non géoréférencés interdite Mode Insertion

EARS LISTENING !!!!!

Standardization:

- Casino+ embeds Mikado
- Mikado downloads BODC controlled vocabs
- Controlled vocab used within EARS, at the moment they live independent lives
- The bridge being to edit manually (semiautomatically) the dictionary and provide new dictionary with BODC vocab(this will not allow to trace changes in the vocab)
- In the .xml file the reference to BODC is in
 - Name
 - Definition link to the URI
 - Description

Multilingual:

In the XML, Name and Description can be translated while preserving the proper link to the BODC concept.

```
<dictionary>
  <unit name="SDN:P061:31:UUUU" definition="SDN:P061:31:UUUU"
    description="is measured in " pluralform="false"
    category="Dimensionless" major="1" minor="0"
    reference="http://www.bodc.ac.uk/" versiondate="2011-09-15"
    versionauthor="EARS Team" versiondescription="version initiale"/>
  <unit name="SDN:P061:31:UKNT" definition="SDN:P061:31:UKNT"
    description="Knots (nautical miles per hour)" pluralform="true"
    category="velocity" major="1" minor="0"
    reference="http://www.bodc.ac.uk/" versiondate="2011-09-15"
    versionauthor="EARS Team" versiondescription="version initiale"/>
  <unit name="SDN:P061:31:ULAA" definition="SDN:P061:31:ULAA"
    description="Metres" pluralform="true" category="length"
    major="1" minor="0"
    reference="http://www.bodc.ac.uk/" versiondate="2011-09-15"
    versionauthor="EARS Team" versiondescription="version initiale"/>
  <unit name="SDN:P061:31:UVAA" definition="SDN:P061:31:UVAA"
    description="Metres per second" pluralform="false"
    category="velocity" major="1" minor="0"
    reference="http://www.bodc.ac.uk/" versiondate="2011-09-15"
    versionauthor="EARS Team" versiondescription="version initiale"/>
  <unit name="kilogram" definition="SDN:P061:31:KIL"
    description="Kilogram" pluralform="true" category="mass"
    major="1" minor="0"
    reference="http://www.bodc.ac.uk/" versiondate="2011-09-15"
    versionauthor="EARS Team" versiondescription="version initiale"/>
  <datadef major="1" minor="0"
    versiondate="2011-09-15"
    versionauthor="EARS Team" versiondescription="version initiale"
    element_name="SDN:P021:60:SVEL" units="SDN:P061:31:ULAA"
    shortunits="ms" float="true" missing_value="-1000000"
    positive="up" description="Sound velocity and travel time in the water column"/>
  <device deviceid="GPTEST_MOXA" devicename="GPTEST_MOXA"
    sourcetype="trl" firstusedate="1999" position="passerelle"
    latestcalibrationdate="2000" calibrationparameters=""
    installdate="1999" workingparameters="Diffu NMEA">
    <message name="GPTEST_MOXA_builtin" major="1" minor="0">
      <frame name="NMEA_gpctest">
        <match>$GPTEST,{reserved},{reserved},{reserved},{reserved},{reserved},{reserved},{reserved},{reserved},{SDN:P021:60:SVEL},</match>
      </frame>
    </message>
    <broadcastaddress port="10100"/>
  </device>
</dictionary>
```

Definition of unit metres per second refers to controlled BODC controlled vocab

Definition of unit is used in datadef for measurement sound velocity in water column
Which is also defined in BODC controlled vocab

Definition of datadef is used in NMEA matching

GOVERNANCE...

A detailed 3D wireframe model of a large ship, showing its complex structure, including the deck, superstructure, and various masts and antennas.

Manual events model

Use controlled vocabularies (referencing to SeaDataNet/GeoSeas/BODC)

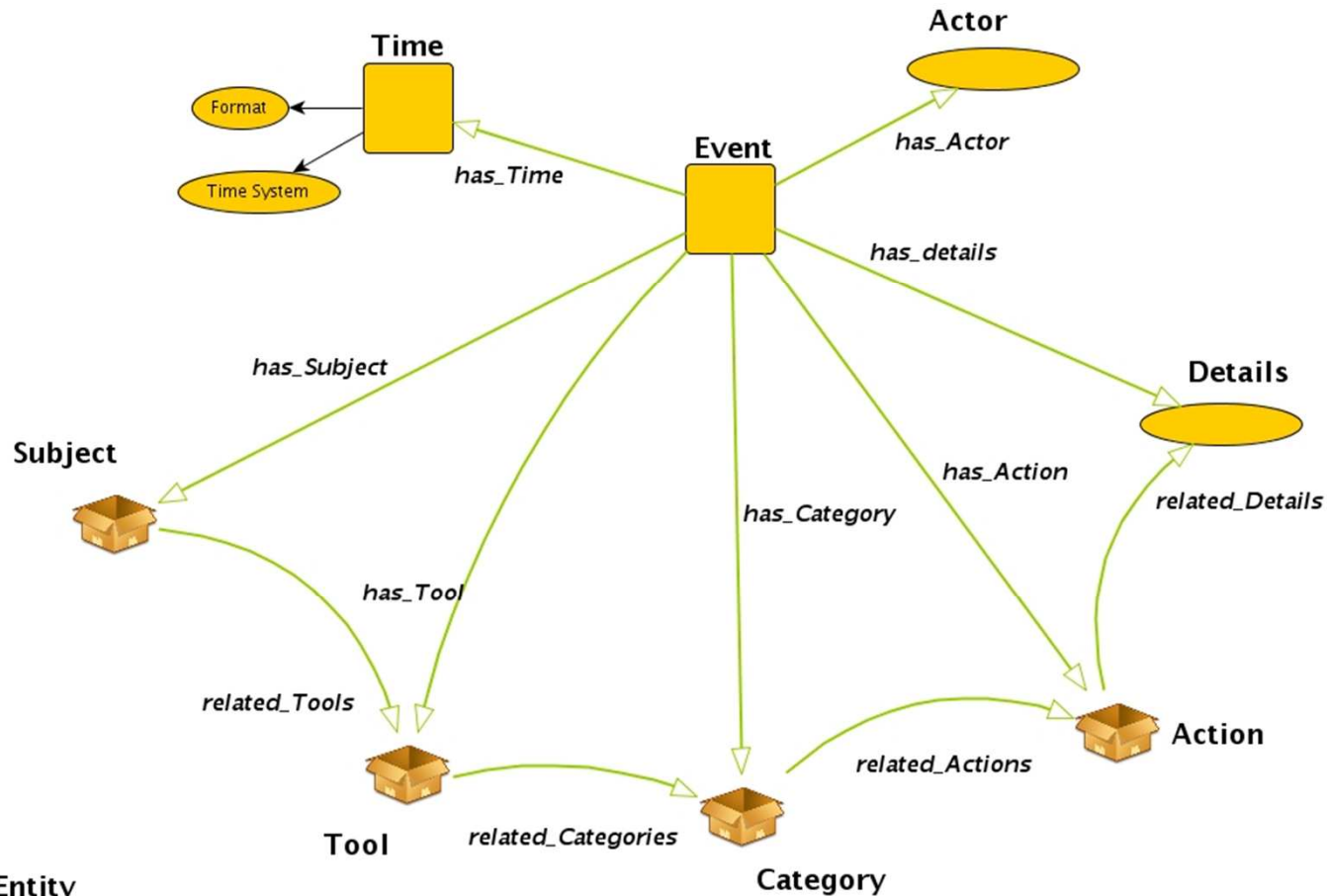
Avoid flat term list (issues in sync with BODC)

Define Events upon a structured definition made of parts

Parts handled using Controlled vocabs (BODC)

Event as composed by different parts under controlled vocabularies.

- 11:10:00 12:01:2010, sub-bottom profiler, recording_system, record, stop,line1,
- 11:10:00 12:01:2010, vessel, phase, profile, start, profile1.3,



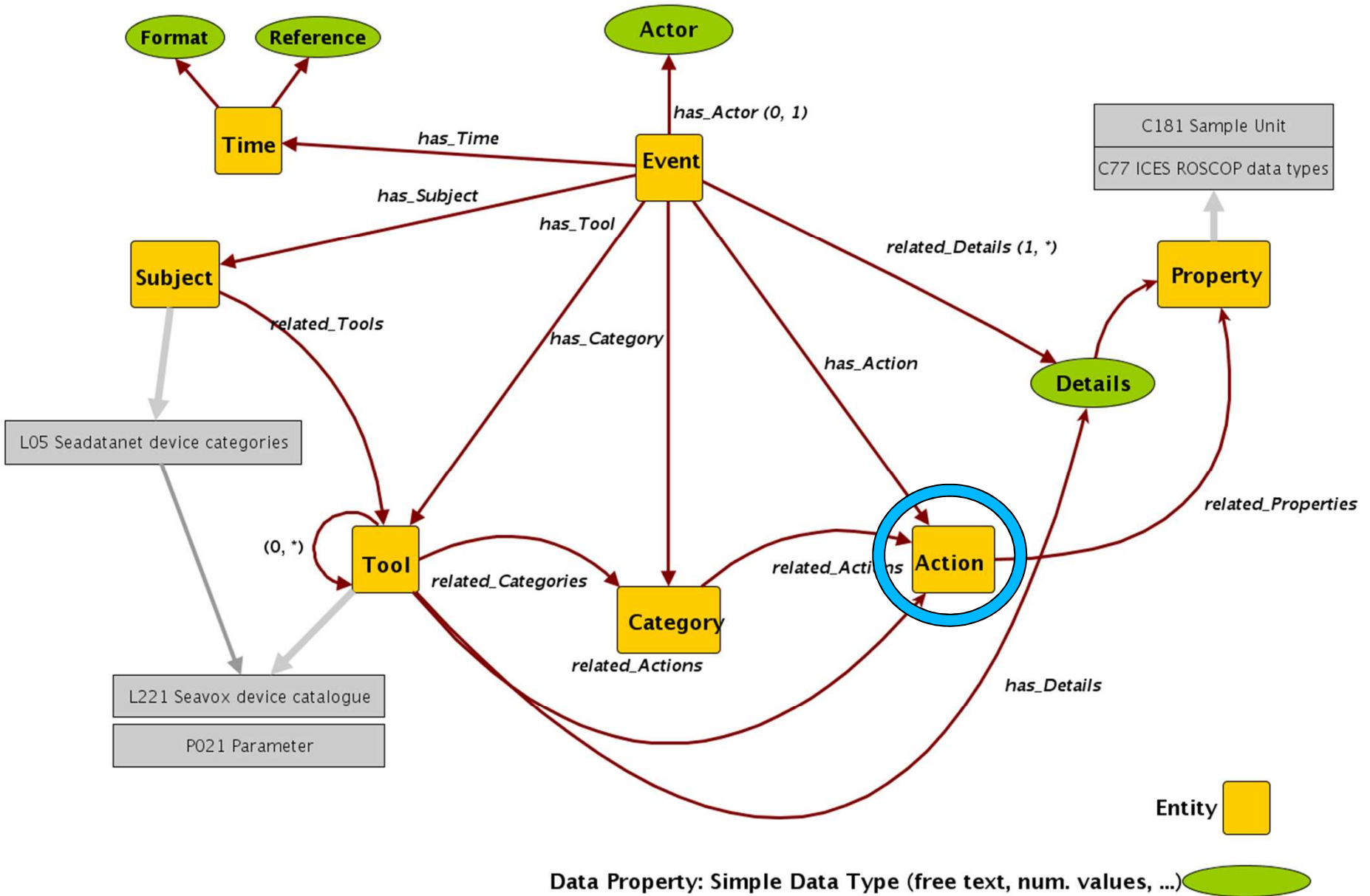
 Entity



Entity in which individuals form a controlled vocabulary (multilingual)



Data Property: Simple Data Type (free text, num. values, ...)



Manual event entry will be based on plain text files containing sets of triples

URI, name, the class and definition has to be given for each term

New terms can be added by any user

name#2= Beam trawl 8 m

category#2=Tools

uri#2= http://www.mumm.ac.be/11BE_TOOLS/BE_TOOL02

Definition#2=Beam trawl with horizontal net opening of 8 m.

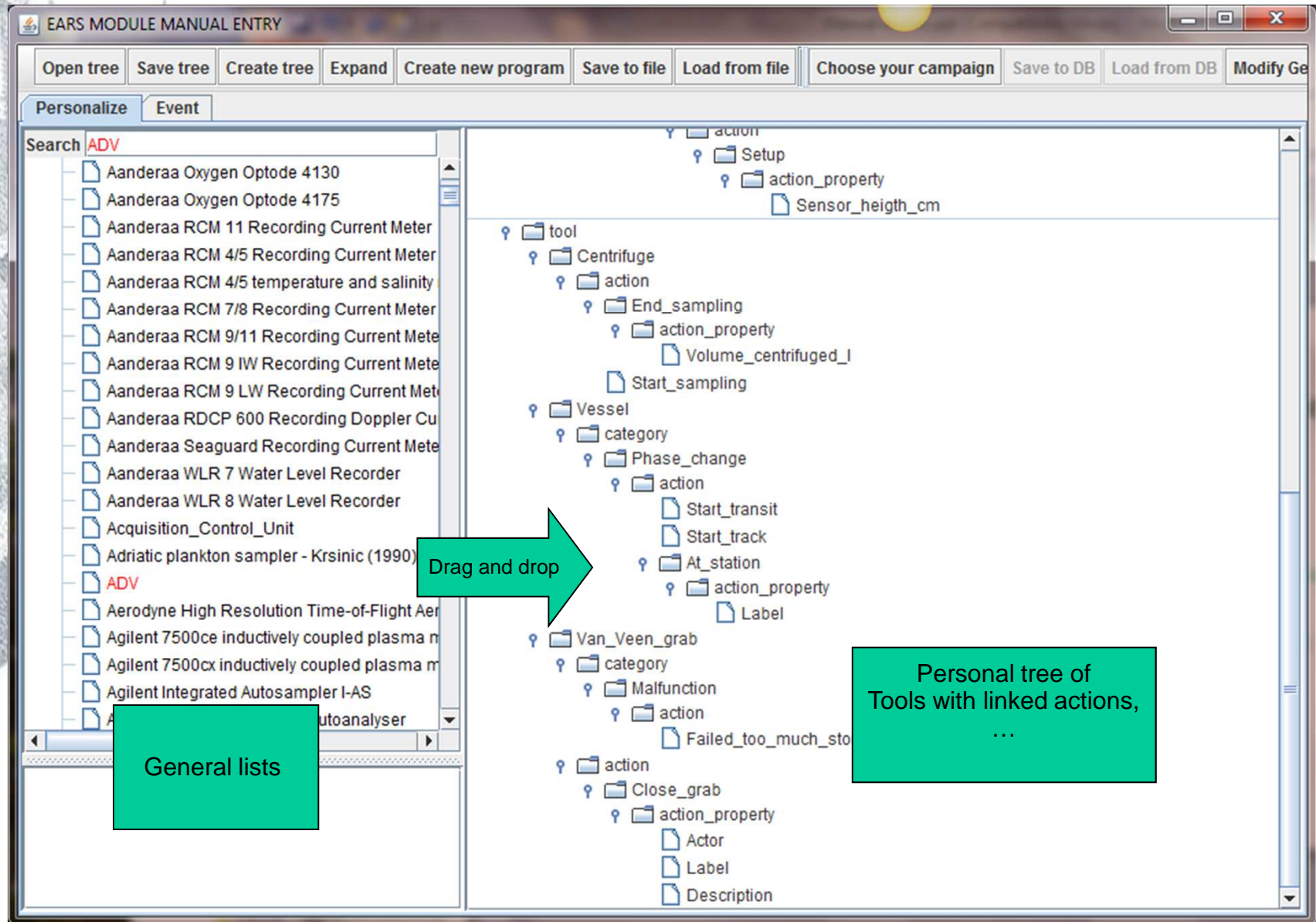
name#3= Sea-Bird SBE 19plus SEACAT CTD

category#3=Tools

uri#3= <http://vocab.ndg.nerc.ac.uk/term/L221/27/TOOL0047>

Definition#3=Self contained self powered CTD profiler. Measures conductivity, temperature and pressure in both profiling (samples .

1st step configuration creation of the personal tree



The screenshot shows the 'EARS MODULE MANUAL ENTRY' application window. The interface includes a menu bar with options like 'Open tree', 'Save tree', 'Create tree', 'Expand', 'Create new program', 'Save to file', 'Load from file', 'Choose your campaign', 'Save to DB', 'Load from DB', and 'Modify Ge'. Below the menu bar are tabs for 'Personalize' and 'Event'. The main area is divided into two panes. The left pane, titled 'Search', contains a list of 'General lists' including various Aanderaa and Agilent sensors. The right pane displays a hierarchical 'Personal tree of Tools with linked actions, ...'. A green arrow labeled 'Drag and drop' points from the 'ADV' item in the search list to the tree structure. The tree structure includes folders like 'action', 'Setup', 'action_property', 'Sensor_heighth_cm', 'tool', 'Centrifuge', 'action', 'End_sampling', 'action_property', 'Volume_centrifuged_I', 'Start_sampling', 'Vessel', 'category', 'Phase_change', 'action', 'Start_transit', 'Start_track', 'At_station', 'action_property', 'Label', 'Van_Veen_grab', 'category', 'Malfunction', 'action', 'Failed_too_much_sto', 'action', 'Close_grab', 'action_property', 'Actor', 'Label', and 'Description'.

Open tree Save tree Create tree Expand Create new program Save to file Load from file Choose your campaign Save to DB Load from DB Modify Ge

Personalize Event

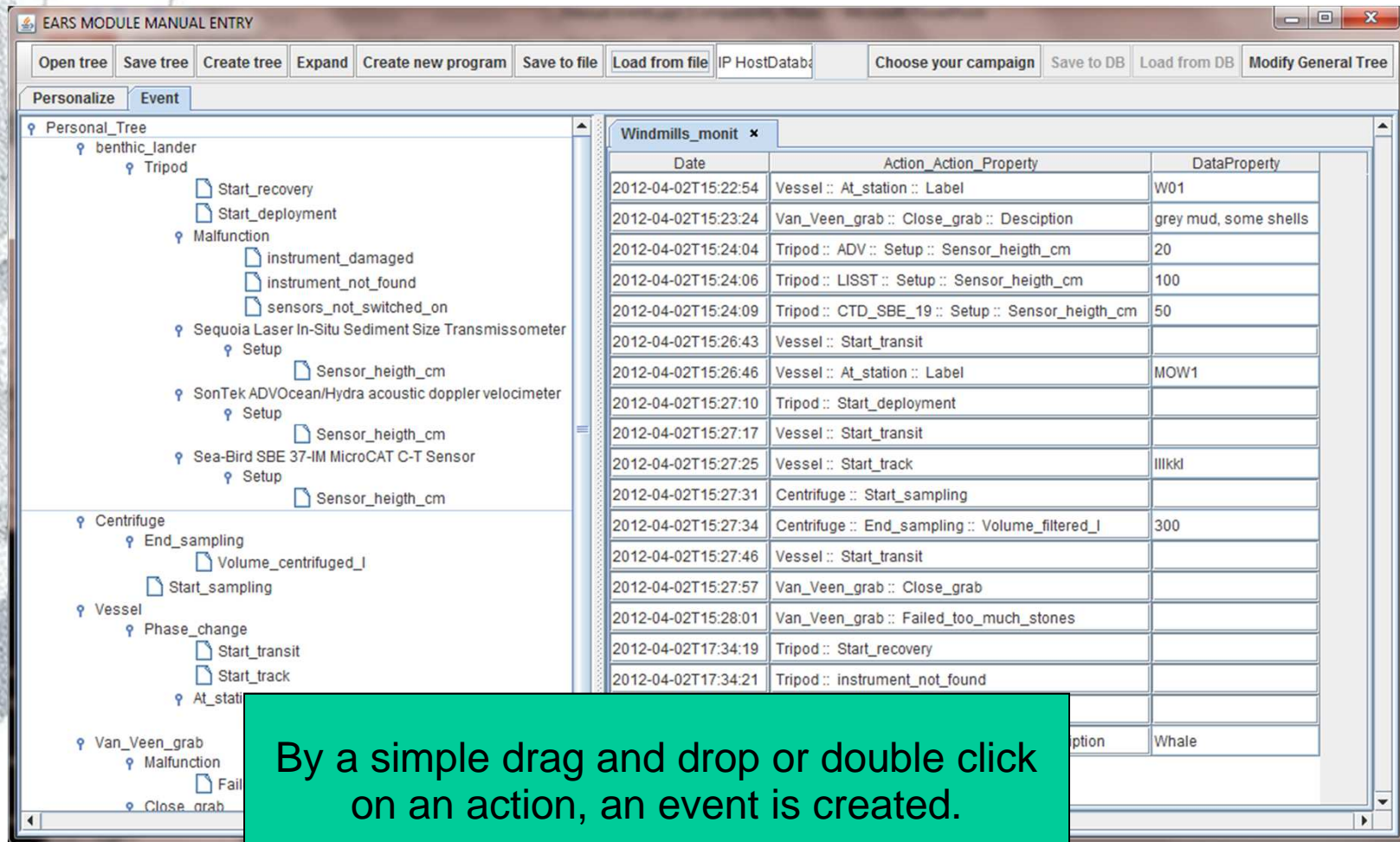
Search **ADV**

- Aanderaa Oxygen Optode 4130
- Aanderaa Oxygen Optode 4175
- Aanderaa RCM 11 Recording Current Meter
- Aanderaa RCM 4/5 Recording Current Meter
- Aanderaa RCM 4/5 temperature and salinity
- Aanderaa RCM 7/8 Recording Current Meter
- Aanderaa RCM 9/11 Recording Current Mete
- Aanderaa RCM 9 IW Recording Current Mete
- Aanderaa RCM 9 LW Recording Current Met
- Aanderaa RDCP 600 Recording Doppler Cu
- Aanderaa Seaguard Recording Current Mete
- Aanderaa WLR 7 Water Level Recorder
- Aanderaa WLR 8 Water Level Recorder
- Acquisition_Control_Unit
- Adriatic plankton sampler - Krsinic (1990)
- ADV**
- Aerodyne High Resolution Time-of-Flight Aer
- Agilent 7500ce inductively coupled plasma n
- Agilent 7500cx inductively coupled plasma m
- Agilent Integrated Autosampler I-AS
- Autoanalyser

Drag and drop

General lists

Personal tree of Tools with linked actions, ...



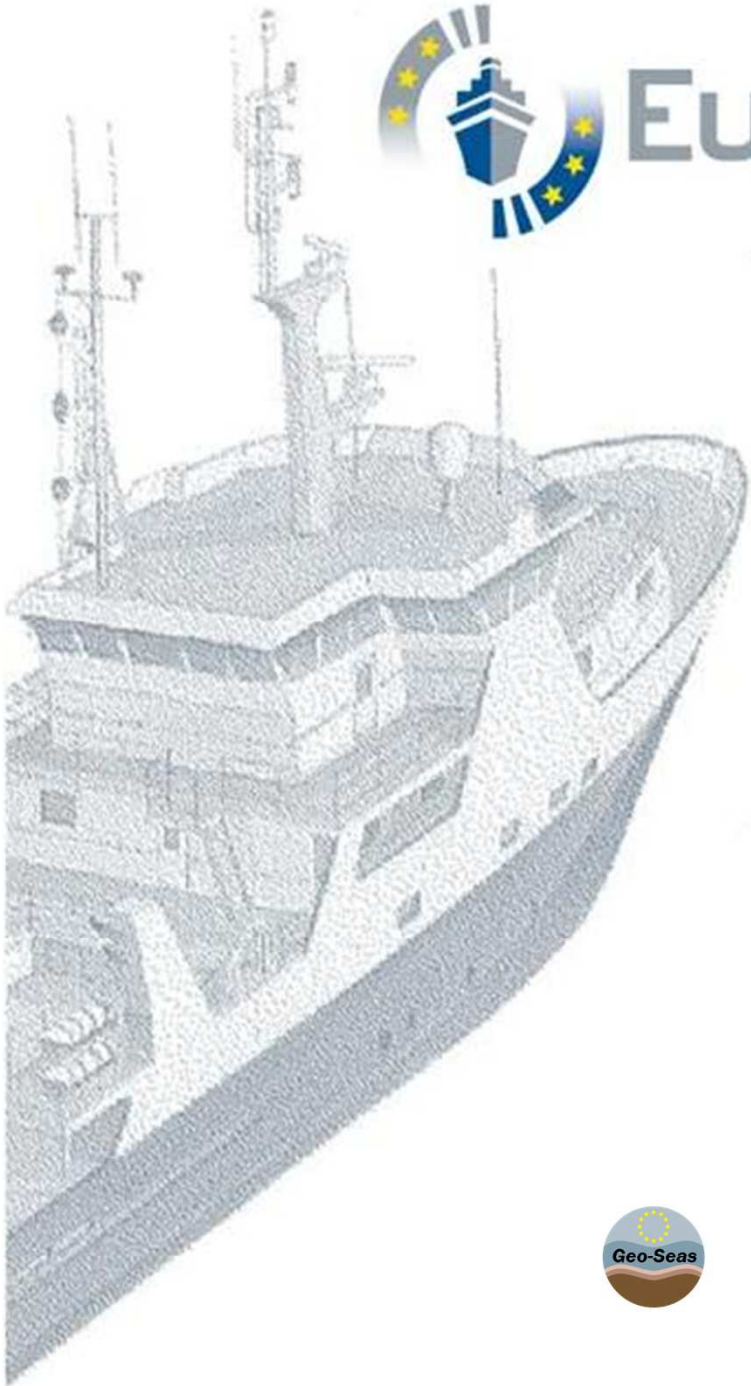
The screenshot shows the 'EARS MODULE MANUAL ENTRY' application window. The interface includes a menu bar with options like 'Open tree', 'Save tree', 'Create tree', 'Expand', 'Create new program', 'Save to file', 'Load from file', 'IP HostDatabase', 'Choose your campaign', 'Save to DB', 'Load from DB', and 'Modify General Tree'. Below the menu bar are two tabs: 'Personalize' and 'Event'. The 'Event' tab is active, displaying a tree view on the left and a table of events on the right.

The tree view on the left is titled 'Personal_Tree' and contains several categories:

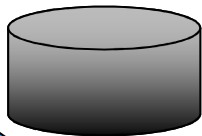
- benthic_lander
 - Tripod
 - Start_recovery
 - Start_deployment
 - Malfuction
 - instrument_damaged
 - instrument_not_found
 - sensors_not_switched_on
 - Sequoia Laser In-Situ Sediment Size Transmissometer
 - Setup
 - Sensor_heighth_cm
 - SonTek ADVOcean/Hydra acoustic doppler velocimeter
 - Setup
 - Sensor_heighth_cm
 - Sea-Bird SBE 37-IM MicroCAT C-T Sensor
 - Setup
 - Sensor_heighth_cm
- Centrifuge
 - End_sampling
 - Volume_centrifuged_l
 - Start_sampling
- Vessel
 - Phase_change
 - Start_transit
 - Start_track
 - At_stati
- Van_Veen_grab
 - Malfuction
 - Fail
 - Close_grab

By a simple drag and drop or double click on an action, an event is created.

Date	Action_Action_Property	DataProperty
2012-04-02T15:22:54	Vessel :: At_station :: Label	W01
2012-04-02T15:23:24	Van_Veen_grab :: Close_grab :: Description	grey mud, some shells
2012-04-02T15:24:04	Tripod :: ADV :: Setup :: Sensor_heighth_cm	20
2012-04-02T15:24:06	Tripod :: LISST :: Setup :: Sensor_heighth_cm	100
2012-04-02T15:24:09	Tripod :: CTD_SBE_19 :: Setup :: Sensor_heighth_cm	50
2012-04-02T15:26:43	Vessel :: Start_transit	
2012-04-02T15:26:46	Vessel :: At_station :: Label	MOW1
2012-04-02T15:27:10	Tripod :: Start_deployment	
2012-04-02T15:27:17	Vessel :: Start_transit	
2012-04-02T15:27:25	Vessel :: Start_track	llkkd
2012-04-02T15:27:31	Centrifuge :: Start_sampling	
2012-04-02T15:27:34	Centrifuge :: End_sampling :: Volume_filtered_l	300
2012-04-02T15:27:46	Vessel :: Start_transit	
2012-04-02T15:27:57	Van_Veen_grab :: Close_grab	
2012-04-02T15:28:01	Van_Veen_grab :: Failed_too_much_stones	
2012-04-02T17:34:19	Tripod :: Start_recovery	
2012-04-02T17:34:21	Tripod :: instrument_not_found	
		Whale



Reporting

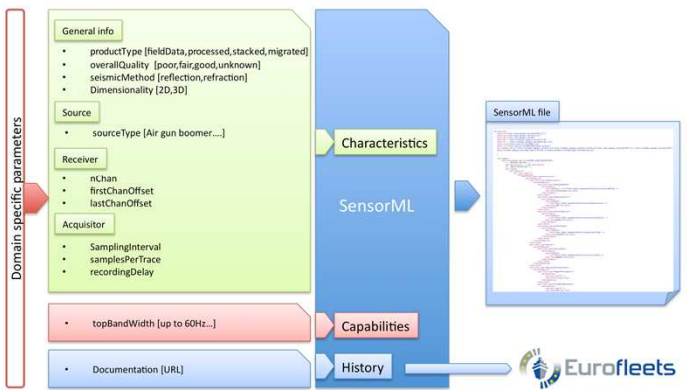


Central EARS DB
=Automatic + manual events

Full Report

Core SSR

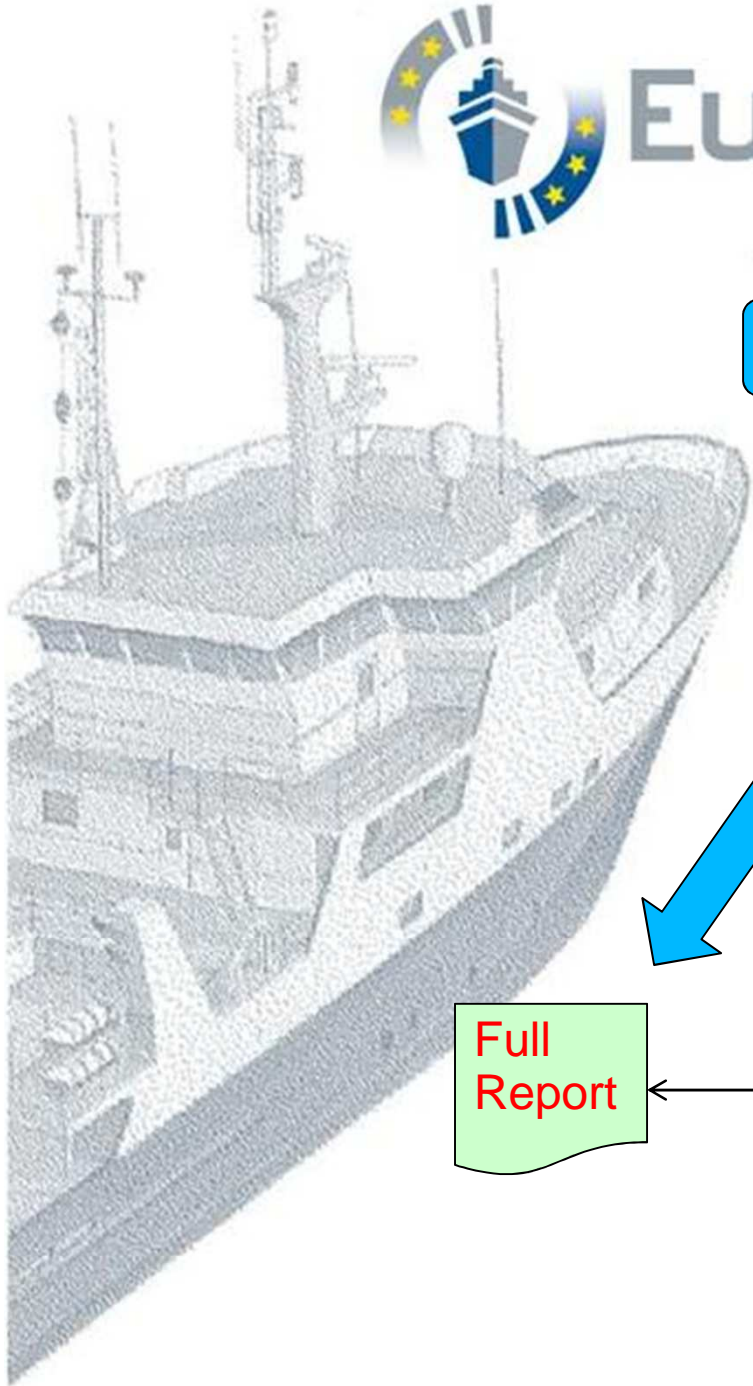
Evior



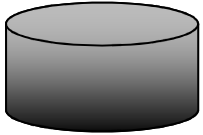

```
<sml:EventList>
  <sml:member name="event-2011-09-08" xlink:arcrole="urn:ogc:def:property:OGC:event">
    <sml:Event gml:id="event20110908113000">
      <sml:date>2011-09-08</sml:date>
      <gml:description>xxxx</gml:description>
      <sml:contact xlink:arcrole="operator" xlink:href="xxxx"/>
      <sml:property name="subject" xlink:role="urn:x-ogc:def:property:OGC:Eurofleets_event:subject">
        <swe:Text>
          <swe:value>UnderWaySystem</swe:value>
        </swe:Text>
      </sml:property>
      <sml:property name="tool" xlink:role="urn:x-ogc:def:property:OGC:Eurofleets_event:tool">
        <swe:Text>
          <swe:value>MOXA SYSTEM</swe:value>
        </swe:Text>
      </sml:property>
      <sml:property name="category" xlink:role="urn:x-ogc:def:property:OGC:Eurofleets_event:category">
        <swe:Text>
          <swe:value>Data record</swe:value>
        </swe:Text>
      </sml:property>
      <sml:property name="action" xlink:role="urn:x-ogc:def:property:OGC:Eurofleets_event:action">
        <swe:Text>
          <swe:value>Navigation record</swe:value>
        </swe:Text>
      </sml:property>
      <sml:property name="detail" xlink:role="urn:x-ogc:def:property:OGC:Eurofleets_event:detail">
        <swe:DataRecord>
          <swe:field name="location">
            .....
          </swe:field>
        </swe:DataRecord>
      </sml:property>
    </sml:Event>
  </sml:member>
</sml:EventList>
```



```
<sml:history>
  <sml:EventList>
    <sml:member name="$event_type" xlink:arcrole="urn:ogc:def:property:OGC:[...]">
      <sml:Event gml:id="$event_id">
        <sml:date>$date </sml:date>
        <gml:description>$event description</gml:description>
        <sml:contactxlink:arcrole="$operator" xlink:href="$operatorReference"/>
        <sml:documentation xlink:arcrole="$event_documentation">
          <sml:Document>
            <gml:description>$document_description</gml:description>
            <sml:onlineResource xlink:href="$document_descriptionURL "/>
          </sml:Document>
        </sml:documentation>
      </sml:Event>
    </sml:member>
  </sml:EventList>
</sml:history>
```

CORE SSR



ssr:SSR @revision_date

EVIOR

Full Report

ssr:identification

- ssr:vessel @SDNIdent
- ssr:operator @SDNIdent

<ssr:status>

- ssr:last_navigation_data @revision_date
 - ssr:date_time
 - ssr:longitude
 - ssr:latitude
 - ssr:heading
 - ssr:velocity @units
 - ssr:depth @units

ssr:cruise_information @revision_date

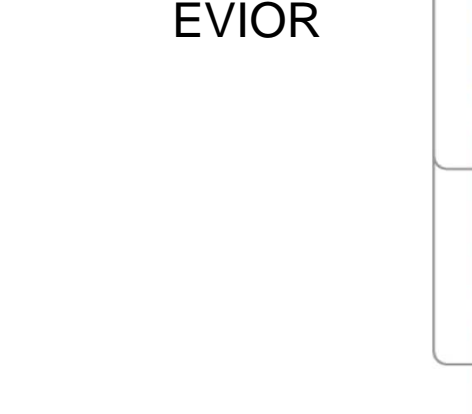
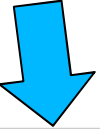
- ssr:cruise_id
- ssr:cruise_start_date

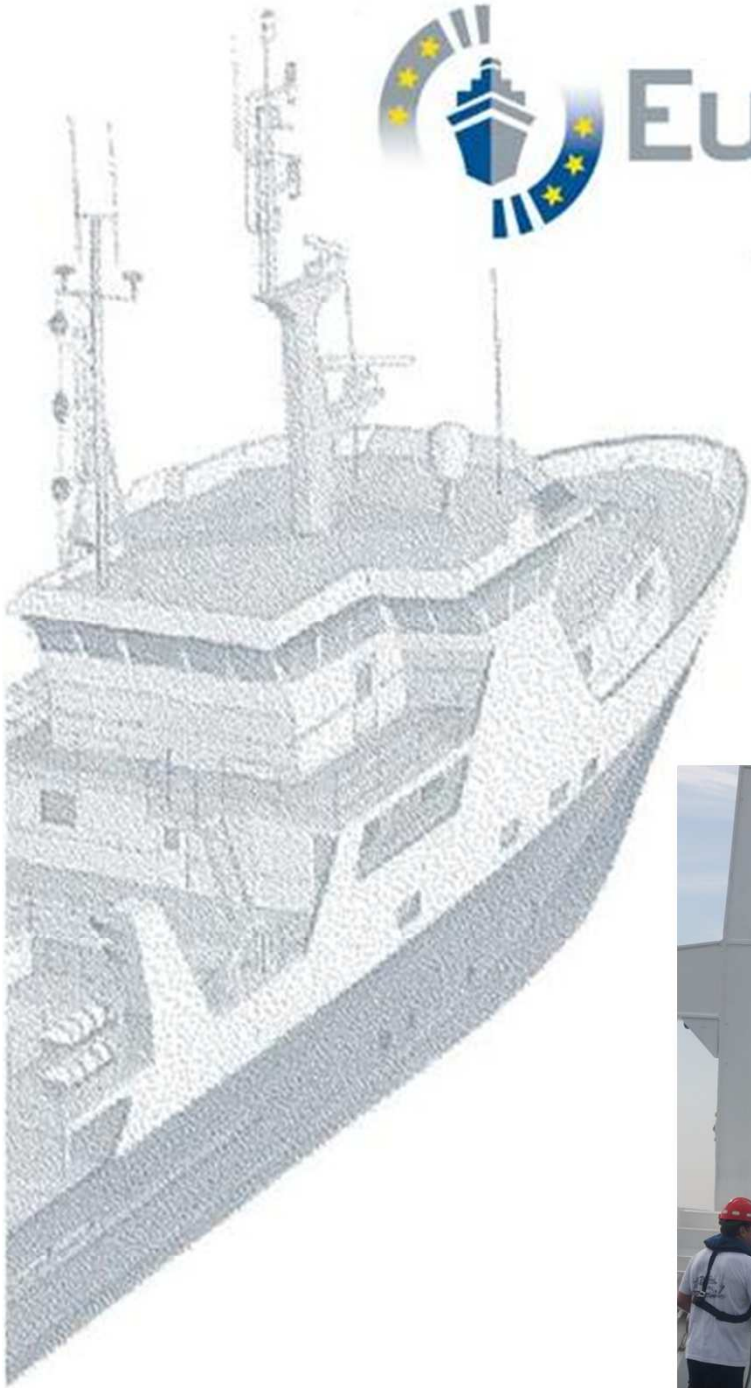
ssr:actual_working_area

- ssr:daily_navigation_track @revision_date @xlink:href

ssr:daily_event_summary

- ssr:daily_event_report @revision_date @xlink:href

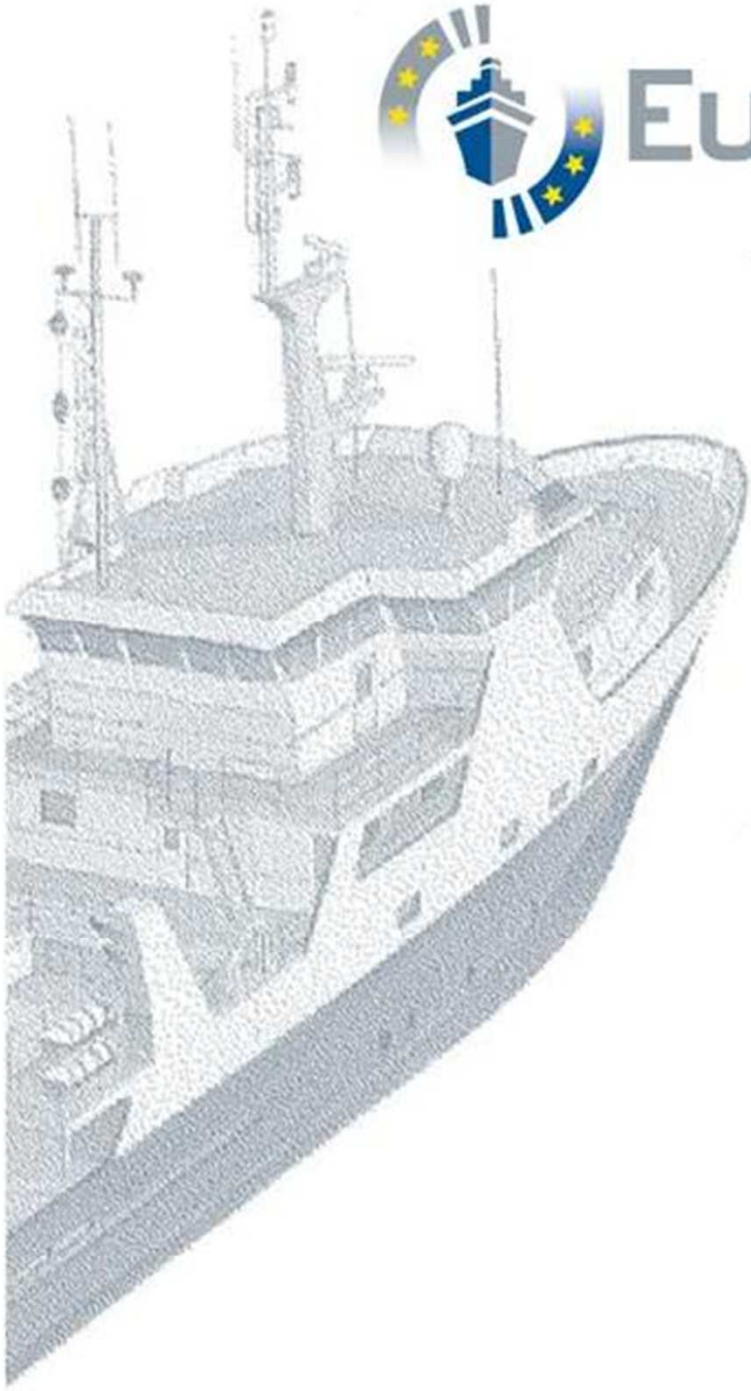




Achievements:

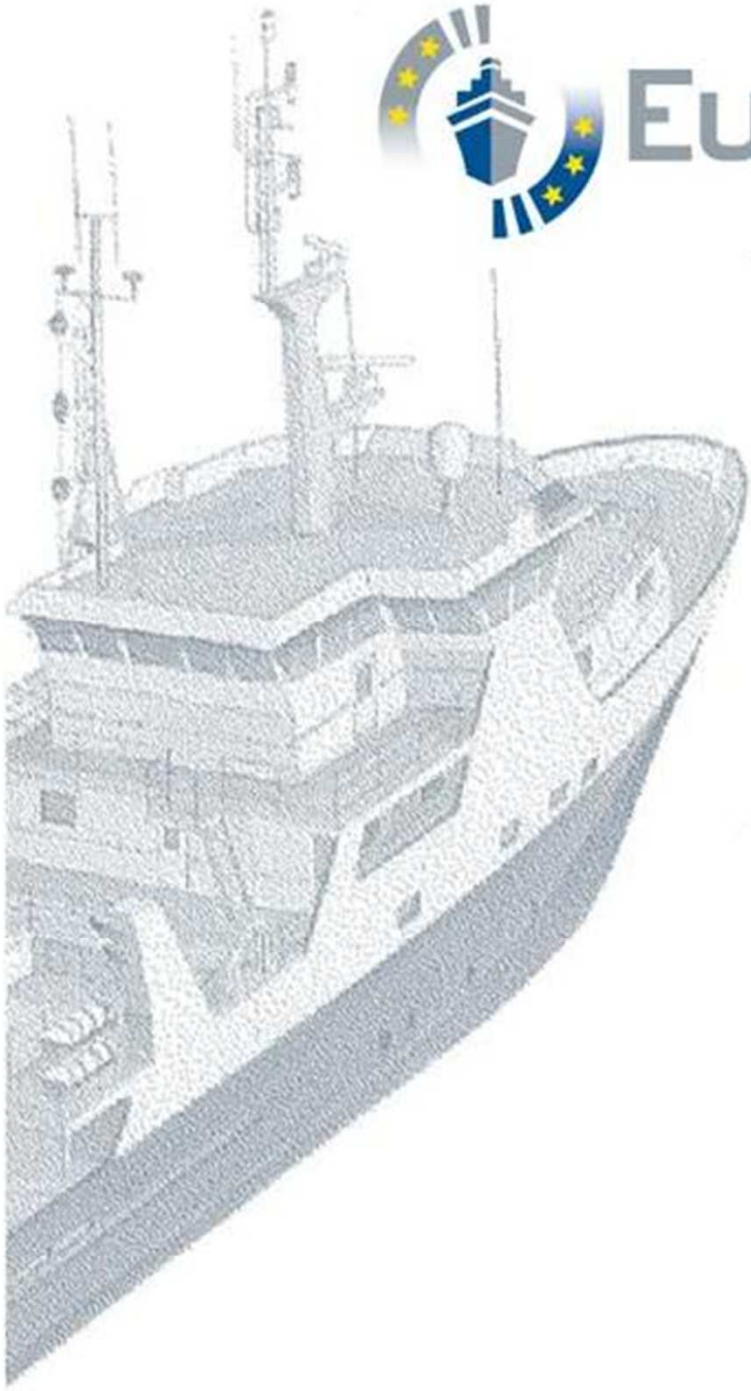
A new tool is available (EARS) that can record and report manual and automatic events during a survey and that is integrated with data infrastructures as SDN/GeoSeas/CSR





Open issues / future work

- Standardization automatic events; will come once a larger catalogue will be available through reuse of configuration files.
- Governance of configuration settings (vocabs)
- Governance of action vocab
- Ontology (please visit Poster)
- Integration with R2R (ready for existing vocabs, L005, L221... delayed for action vocabs until it will be available →ODIP project)
- Installation and use within Eurofleets2



Thank you

Contact: pdiviacco@ogs.trieste.it