Smart Emergency Response Systems (SmartERS) the Oil Spill use case

not only sensing and sharing but also Smart

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Emergency Context

Responding to a natural or artificial emergency (earthquake, flood, oil spill, etc.) requires to ***access, exchange, share*** and of course ***understand*** many types of geospatial information provided by several types of sensors. The emergencies community since years has been developing the concept of **Common Operating Picture (COP)**.

A Common Operating Picture (COP) is a Geospatial tool that **gathers** and **provides** a single source of information for **situational awareness**, to support emergency management and response personnel involved in an incident.

Emergency Processes

1. Preparedness. This phase is characterized by planning the emergency capabilities, the data identification and acquisition.

2. Response. *The focus of this phase is to put in place the initial response activities, damage limitation, resource acquisition.*

3. Recovery. This phase deals with the actions for containing and cleaning-up the contaminated area.

4. Mitigation. The necessary measures to mitigate the risk that an accident could happen are put in place during this phase.

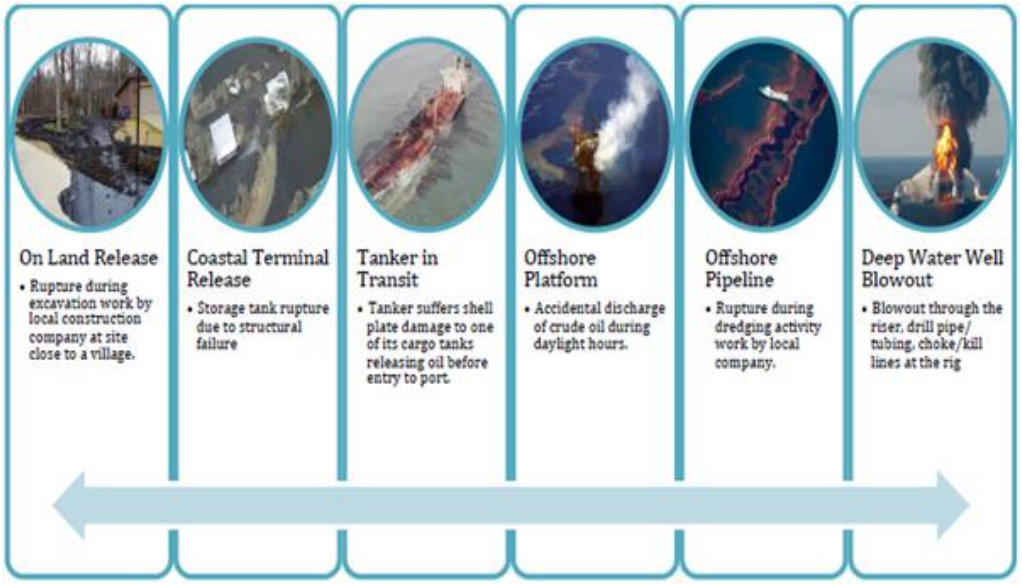
Emergency People

Operational coordination takes place at the location of the accident; the strategic and tactical coordination take place in coordination centres.

The **strategic** coordination team *decides what should be done* for responding to an emergency, and *how to communicate to the public*.

The **tactical** coordination team *turns the orders from strategic team into actions* to be executed by the **operational team**, which *responds to the emergency situation*.

COP - Oil Spill Responses



Focus on:

- "tanker in transit“
- "offshore platform”

ERS shall be smart enough to help Emergency teams to take the right decision at the right time

- COP shall be driven by several **contextual considerations.**
- COP shall provide coherent **semantically meaningfully maps.**
- COP shall provide a **continuously updated** overview of an accident.

Emergency Response Issues

Improve the efficiency of Emergency Response System

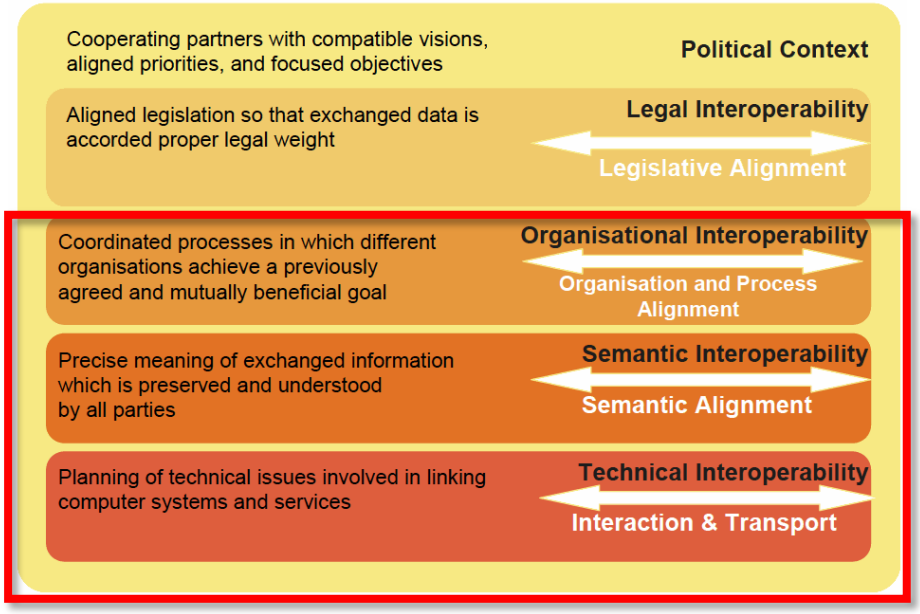
Performance

Oil spills emergencies have provided lessons learned and identified issues to be addressed as:

1. Lack of agreement on what ***data*** needed to be tracked and transmitted;
2. ***Vast geography*** of the response area of operations;
3. Lack of availability of appropriate ***technology*** to exchange information;
4. Limited ability to ***push real-time*** data, throughout the response organization
5. Different computing ***standards***.

Interoperability

Interoperability

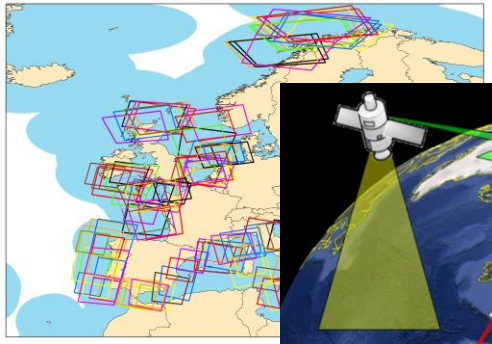


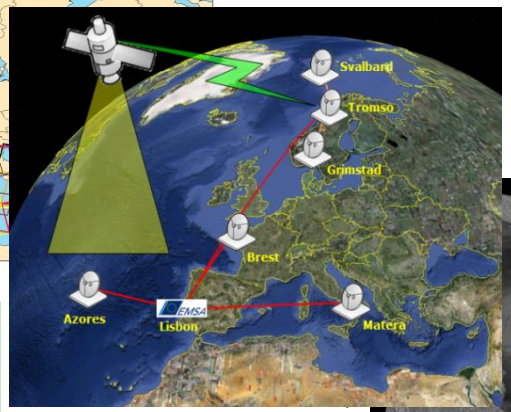
Despite the effort that Private Sector and Public Administrations have been putting since years, the goal to provide an exhaustive picture of the situation during an Emergency Response is still far to be reached.

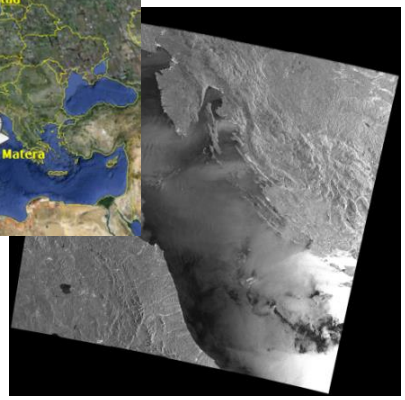
European Interoperability Framework viewpoints:

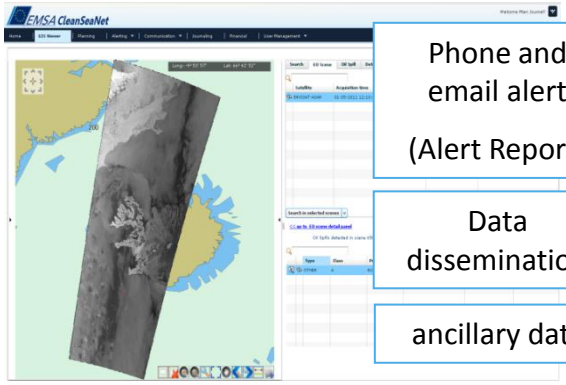
- **Legal**: (*legal framework*) Copernicus; CISE; IMP; INSPIRE etc.
- **Organizational**: (*business process alignment*) Service Level Agreement
- **Semantic**: (*exchange meaningful information*) Standards
- **Technology**: (*linking information systems*) Service Oriented Architecture (request/response communication style- Spatial Data Infrastructures).

Performance: Near real time









Analysis Results

(EO derived information)

Phone and email alert

(Alert Report)

Data dissemination

ancillary data

Planning

Acquisition and Processing

Features Analysis

Product Processing and Alert Generation

Feedback

Earth Observation Service Providers

EMSA EO Data Centre

T0 = End of scene acquisition

T = T0 + 30 min

Research

Emergency Response is not only sensing, and sharing but it should be smart enough to encompass intelligent actions. “smart Emergency Response System” (SmartERS).

@Limited ability to ***push real-time*** data.

Therefore:

1. Rapid collection and processing of contextual data from different sources based - **semantic web**;
2. **Internet of Things** (ioT) as platform for Emergency Response Systems;
3. **Publish and Subscribe Architectures** for Emergency Systems

Enablers

Authoritative Sensing

SDI, EODC

crucial but
not enough

Business Sensing

UAV

Huge volume
and variety

Open Data

Event Driven &
ROArchitectures

Intelligent Actions

Smart ERS

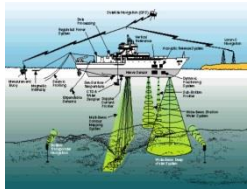
Data Mining
Semantic Web

Internet Of Things

Regarded as
not reliable

Citizen Sensing

social networks

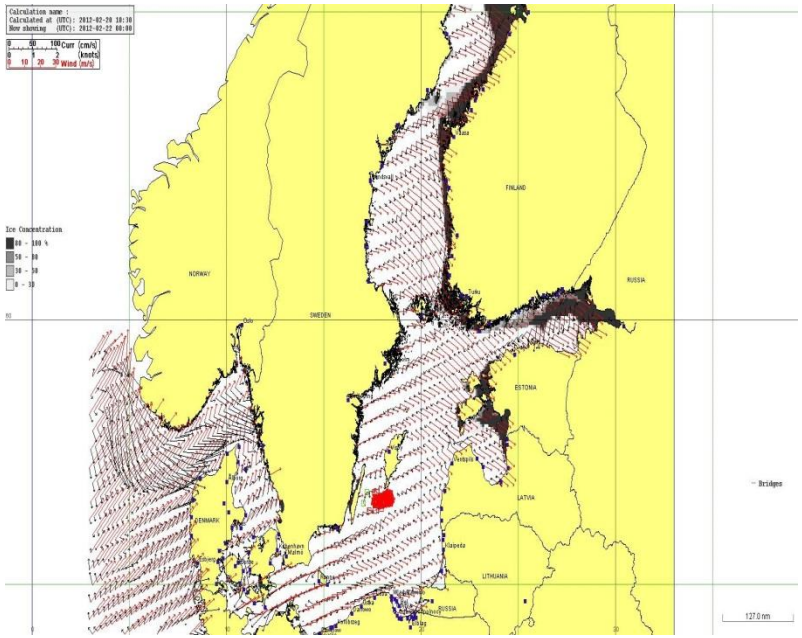


Vessels as Sensors

fluorometer sensors

Huge N. sensors

SmartERS use cases



The following use cases have been exploiting based on semantic web mining:

- User Driven EO acquisition.

- Gather from web contextual information;

- Multi-Sensors Oil Spill Monitoring;

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EO Lessons Learnt