Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

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Decision Aid for Marine Munitions

EU STRATEGY FOR THE BALTIC SEA REGION
FLAGSHIP

Decision Support System - DSS

Matthias Reuter
Sabine Bohlmann

TU Clausthal

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WP5 data base

DAIMON related data from project partners for conditioning the DSS. In detail:

- data from munition objects out of munition data base
- Fish/mussel data
- Sediment data
- Wrack data (VRAKA model)
- Current model
- Leakage model

→ In summery more than 25.000 data sets

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Data handling/data storage

- storage in a classical database structure
- exchange via REST API Services
- storage on internal DSS server

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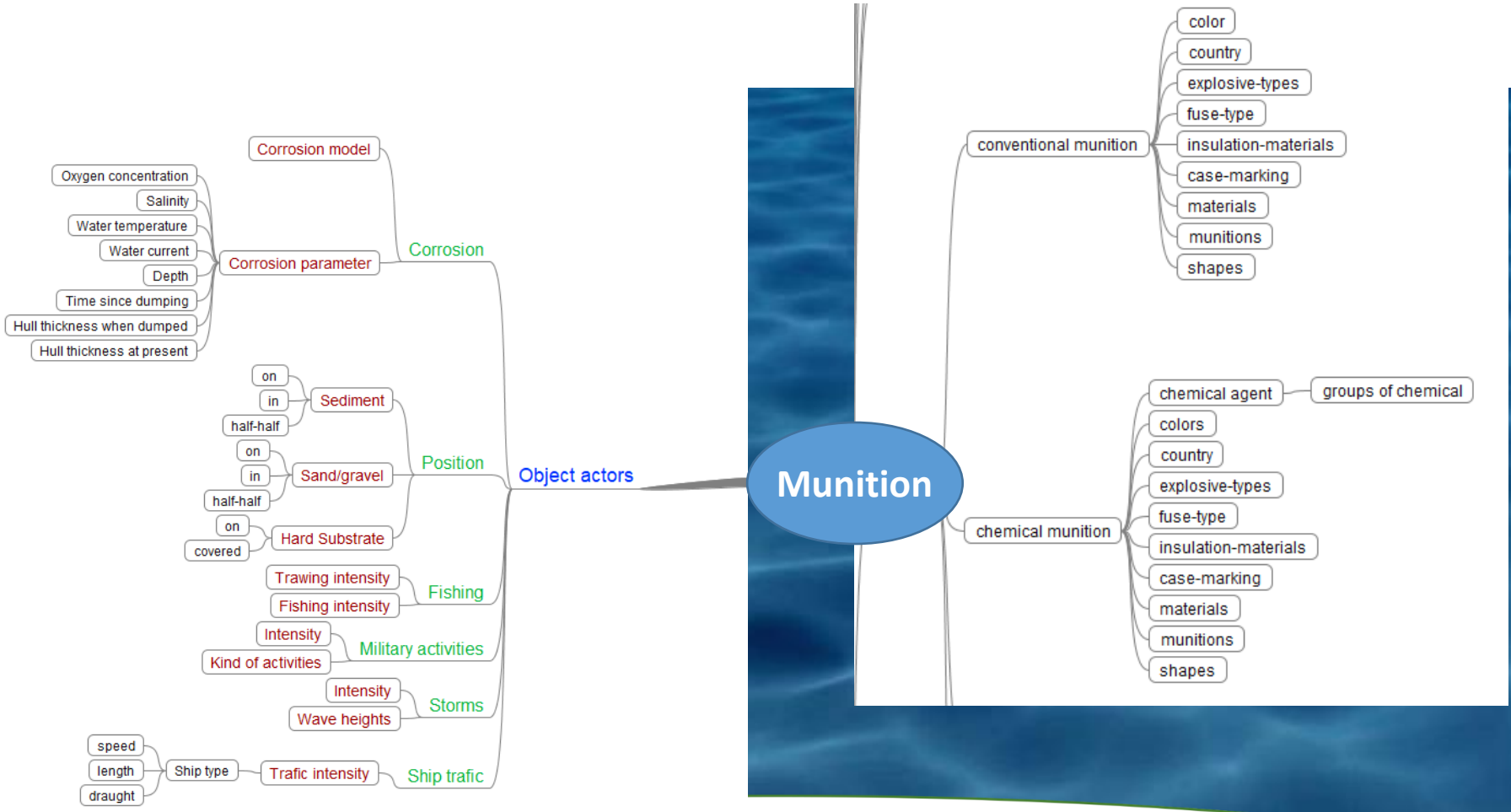
Data handling/data storage

For a sofisticated decision support these data are combined with situation relevant environmental data describing:

- Ship traffic intensity
- Fishing intensity
- Meterological data
- Elementary physical and chemical data about the region where the objects and the protection goods are placed
- Cadastral maps with information about depth, economic zones, protection areas etc.

Resulting concept for a decision tree



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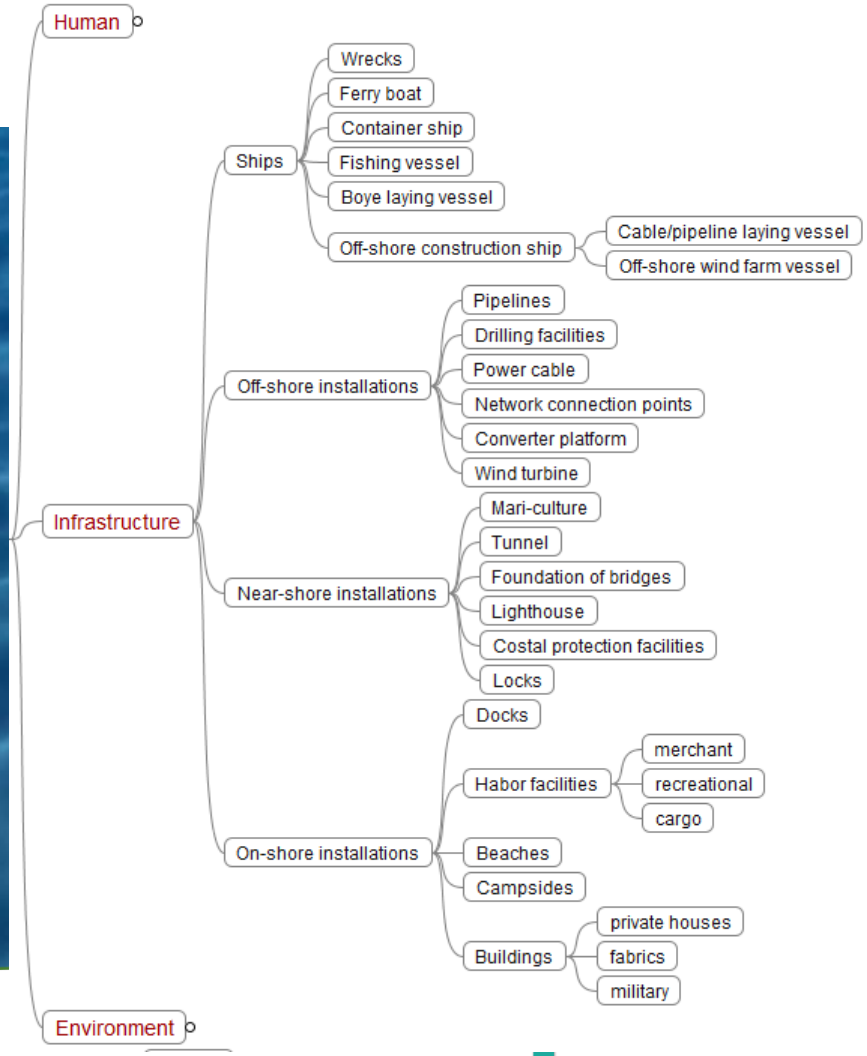
Decision tree for influence to protection goods

Protection goods:

Fishermen
Tourist
Fish
Flora/Fauna
Infrastructure
Ship traffic



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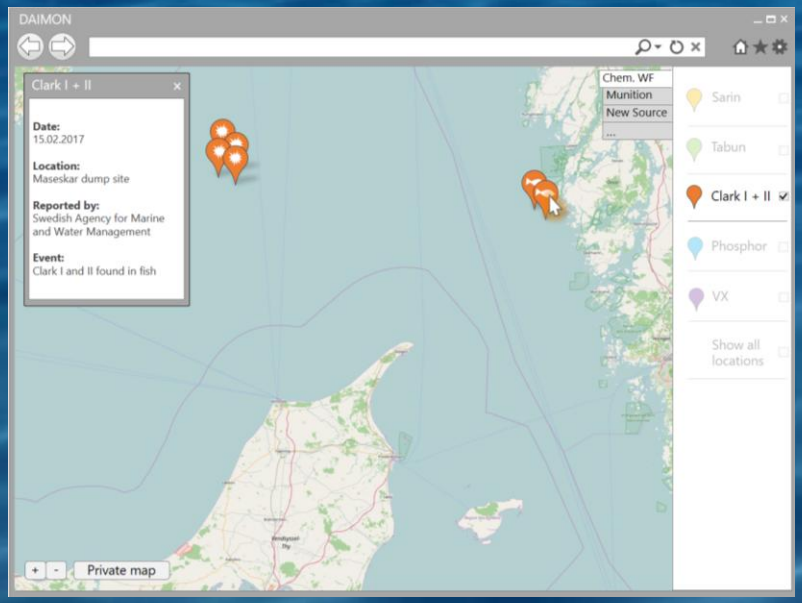
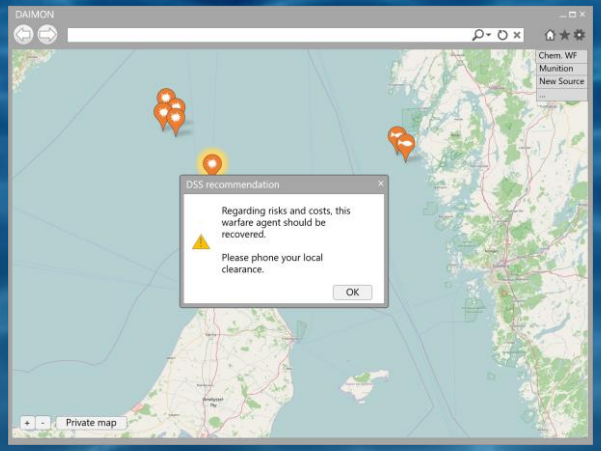
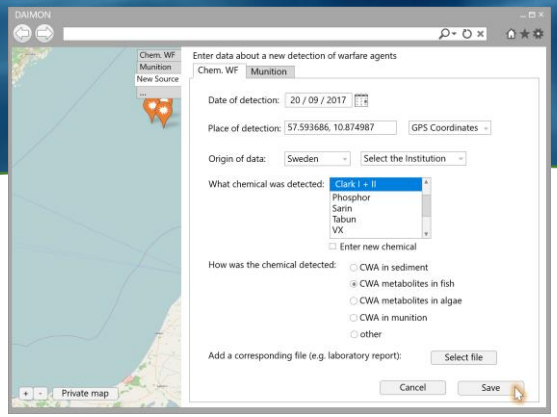
Realisation and examples/ First step

Georeferenced visualisation of objects







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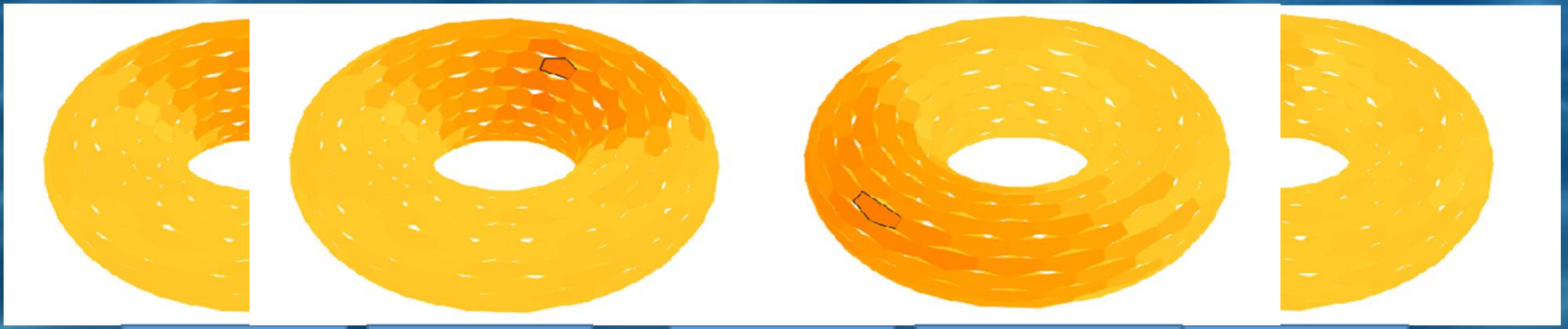
Realisation and examples/ Second step

Implementation of a modula (neural net based) decision supporting system, involving moduls for:



2 nets for fishes	1 net for wracks	2 nets for munition	1 net for environment	1 net for sediment

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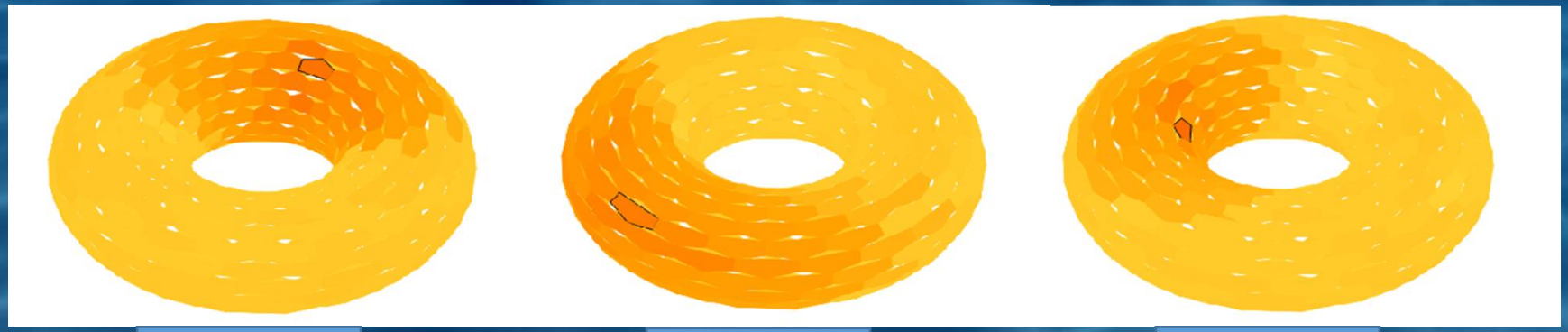
Realisation and examples/ Third step

Neural nets for combing objects – protection goods



Radius munition to ship

Radius fish to tourist

Radius wrack to fishermen

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WP5.2 Development of DSS

This is how it looks like when the nets are trained:

How it works in detail/Part one: object parameters

Actual state of munition

```
"value": [
  {
    "munition1_1": {
      "type": 2,
      "armed": 1,
      "corroded": 2,
      "intakt":  1,
      "position":  1,
      "leckageposition":  0,
      "farbe"  : 1
    }
```

Munition parameter DB TUC

```
],
"objectparameter":[
{
    "gefahreinschaetzung": 3,
    "object": {
      "typ": 2,
      "material": 1,
      "thickness": 2,
      "chemical_agent": 2,
      "chemical_agent_weight": 2

    }
```

Sediment VERIFIN et al

```
"value": [
  {
    "finnlandfish": {
      "fishkey": 1,
      "institutekey": 0,
      "sulphurmustard related": 1,
      "adamsite related": 1,
      "ClarkI/II related": 1,
      "TPA related": 1,
      "PDCA related": 1,
      "CN": 3,
      "lewisite I related":  0,
      "lewisite II related":  1,
      "total arsenic":  1,
      "farbe": 2
```

Fish data TI-FI/AWI

```
"value": [
  {
    "fish": {
      "fishkey": 1,
      "institutekey": 0,
      "FDI": 1,
      "CF": 1,
      "LHI": 1,
      "muscel": 1,
      "liver": 1,
      "ERY": 3,
      "HB":  0,
      "GLU":  1,
      "HCT":  1,
      "gill"  : 1
```

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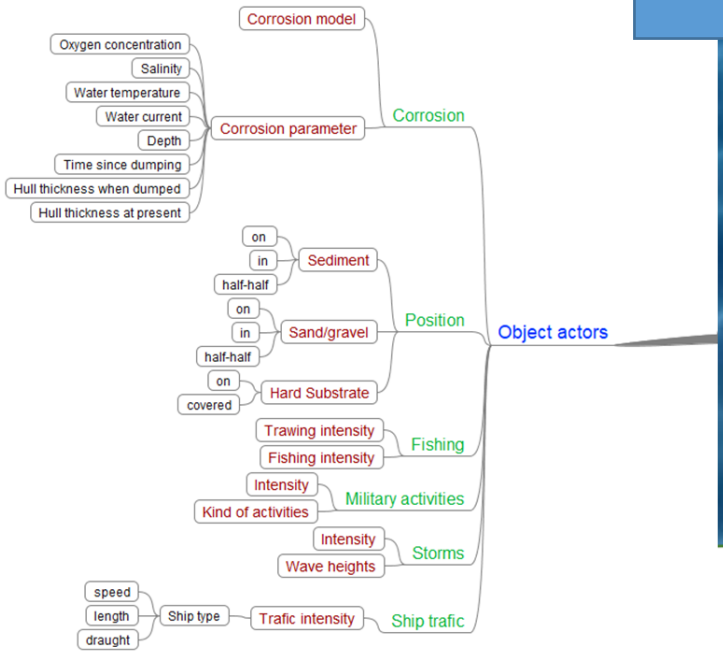
How it works in detail/Part two: Object influencing parameters

Identification and definition of parameters that influence the objects in their environment



Example parameters for munition

Munition

```
"temperature": 15,
"salinity"       : 18,
"current"     : 1,
"radiusobject": 100,
"depth": 90,
"oxygensaturation": 1.5,
"seabedconditions": 1,
"objectlocations": 1,
"otherobjects": 1,
"fishingintensity": 3,
"shiptrafic": 2,
"timeincedumping": 3
```

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How it works in detail/Part three: Scenario relevant parameters

For action in legal aspects, relevant relationship between objects and protection goods have to be taken into account, means

- different management options
- legal aspects
- action plans
- guidelines


```
"radiusobjsg": 80,
"depthtoobj": 80,
"radiusobsgleckage": 80,
"depthobjleckage": 80
```



```
"objectkeys": 3,
"countrykey": 2,
"eez": 1
```

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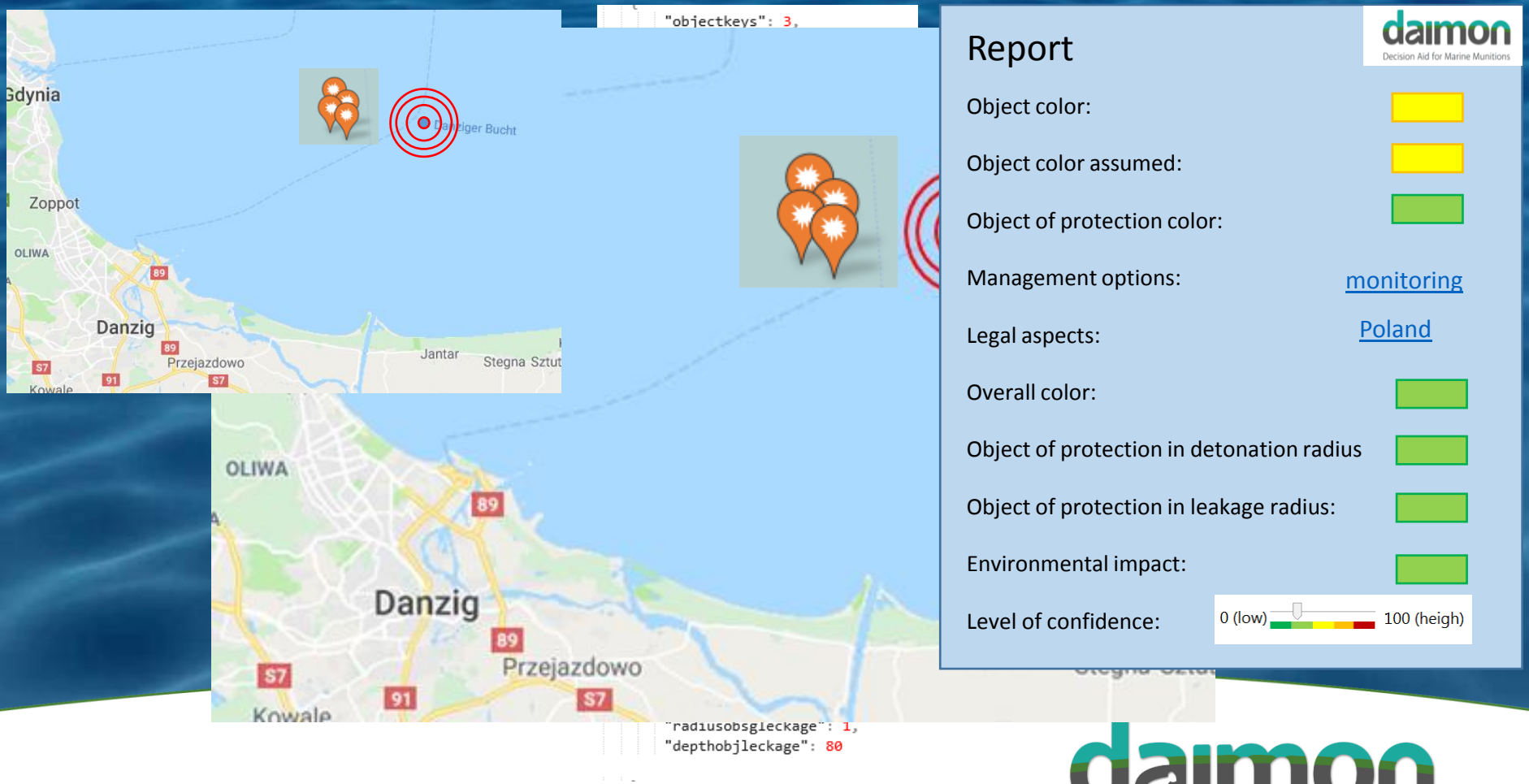
Example

Object: dumped at 80 meters, protection good: fishermen



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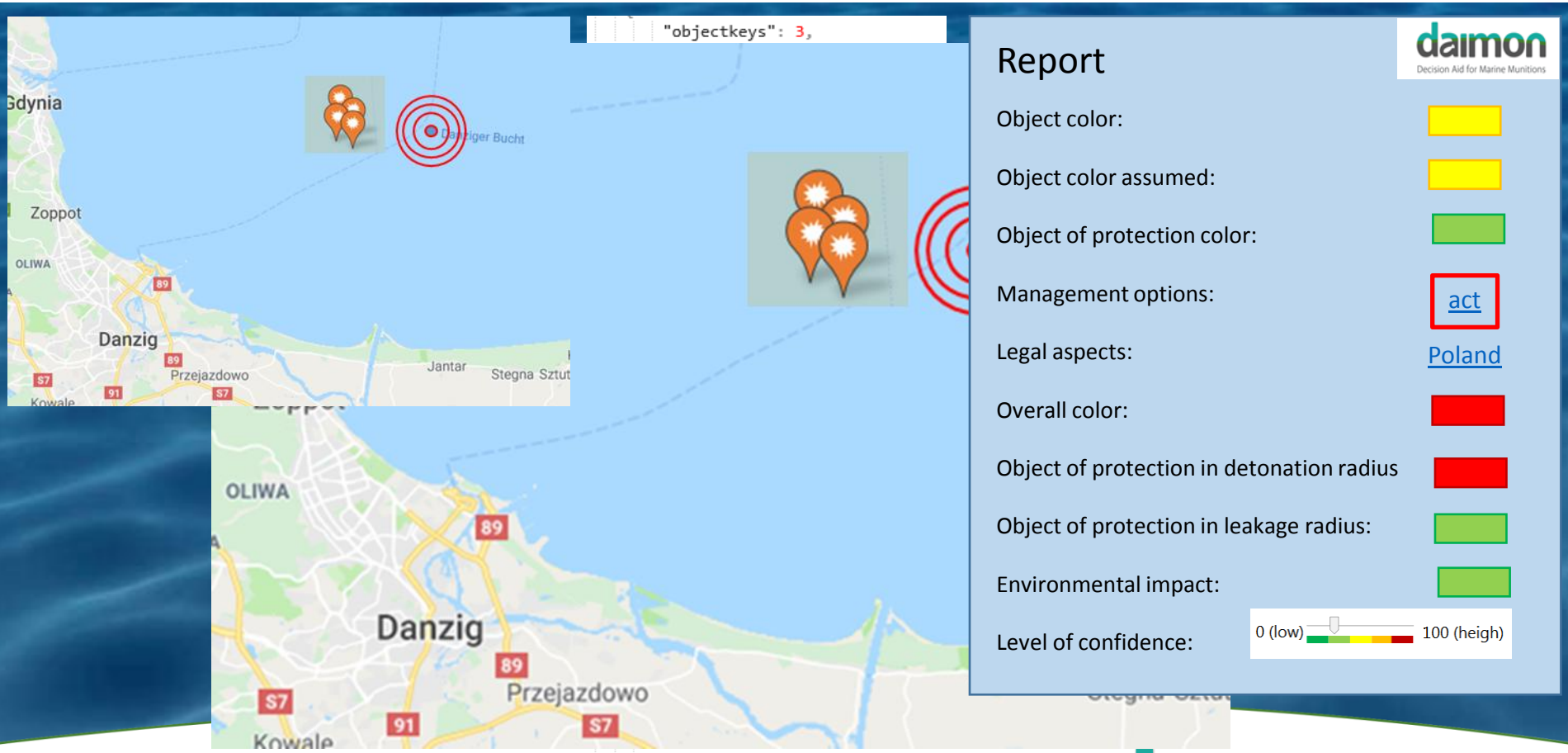
Example

Object: munition on bord, protection good: fishermen



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Contact

Matthias Reuter
Sabine Bohlmann

TU Clausthal, Germany

matthias.reuter@tu-clausthal.de
sabine.bohlmann@tu-clausthal.de

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