



# CNE23 - Data based maintenance

**CDR Olivier GROUARD**

**Deputy head technical division - surface ships**

**[olivier.grouard@intradef.gouv.fr](mailto:olivier.grouard@intradef.gouv.fr)**

# Summary

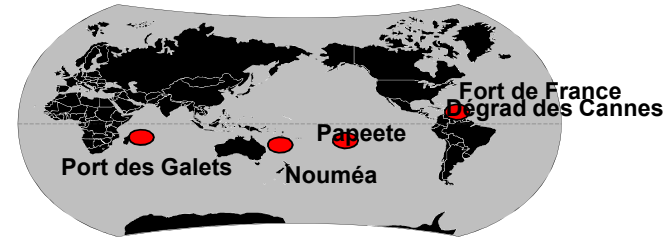
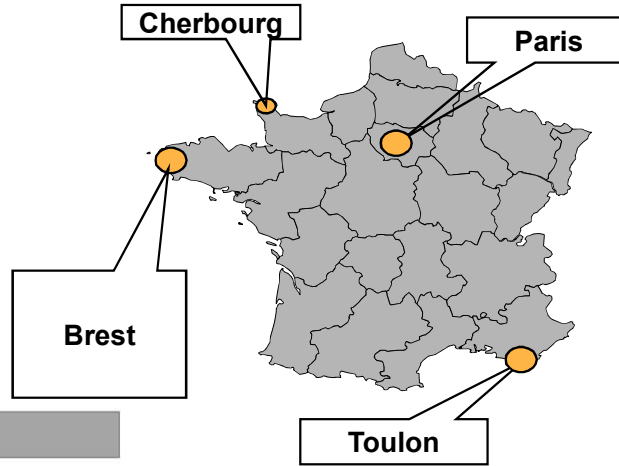
1. Fleet support service in general, technical department specificities
2. Maintenance tools and data : history and situation
3. Navy ship's maintenance constraints
4. Data base maintenance expectation
5. Examples (4)
6. Conclusions

# 1. Fleet Support Service - Service de Soutien de la Flotte (SSF)



Marine nationale – French Navy

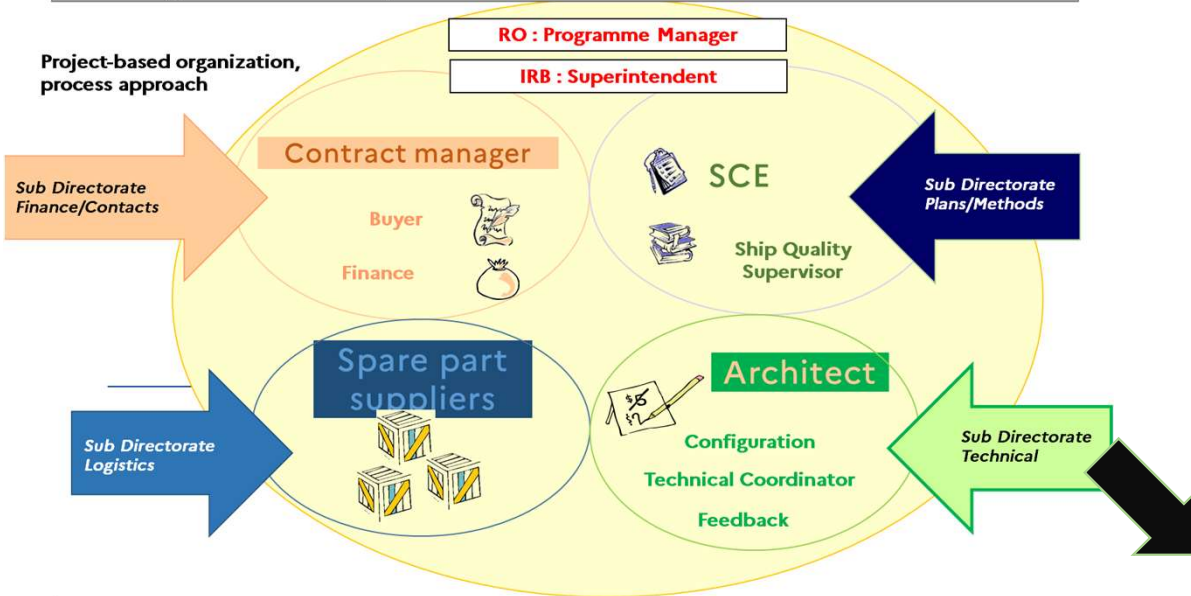
DCSSF – Fleet support service central management



4 Antennas overseas

**SSF Organisation – Operational Team**

Project-based organization, process approach



**SSF Missions :**

- Maintaining a fleet of 400 vessels in ready condition and associated facilities (training equipment, tools, spare parts...)
- Ensure technical availability with efficiency regarding costs

**Maintenance policies**

## 2. Maintenance tools and data : history and situation

## From one data to smart and small data



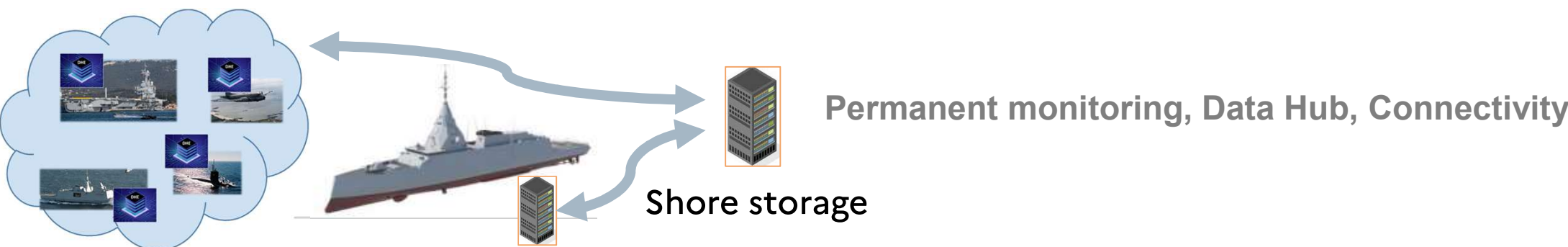
One or few parameters based maintenance



SMS & Tablets  
(Ship Management System)



Data access, simple rules



### 3. Navy ship's constraints, to data and to maintenance

## Navy ship's constraints

### Data constraints

- Non-repetitive activity
  - ✓ Environment (temperature, sea state)
  - ✓ Ship's attitude (vibration, roll)
- Data protection (ship's position)
- Non permanent connectivity
- Low number of equipment's
- Limited data storage volume

### Maintenance constraints

- Necessary reliability
- Trust (time it takes to gain, willingness to check)
- Planning
- Information systems & culture
  - ✓ based on running hours



## 4. Data based maintenance expectations

# What can we expect

## Three levels

### ■ Diagnostic aid (small data)

- ✓ Synchronised representation of parameters
- ✓ Long term tendency & timescale zoom
- ✓ Scatter plots (normal & abnormal values)



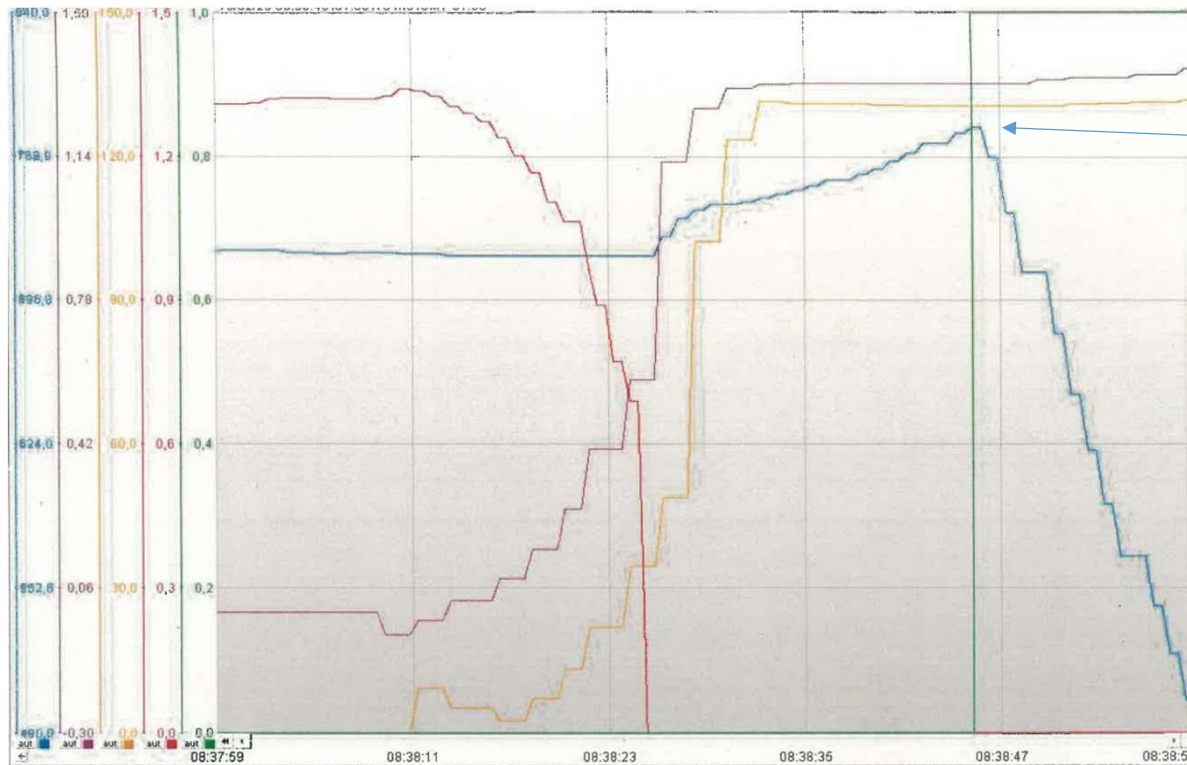
### ■ Damage forecast / Tasks prediction (smart data)



### ■ Completely based maintenance (artificial intelligence)

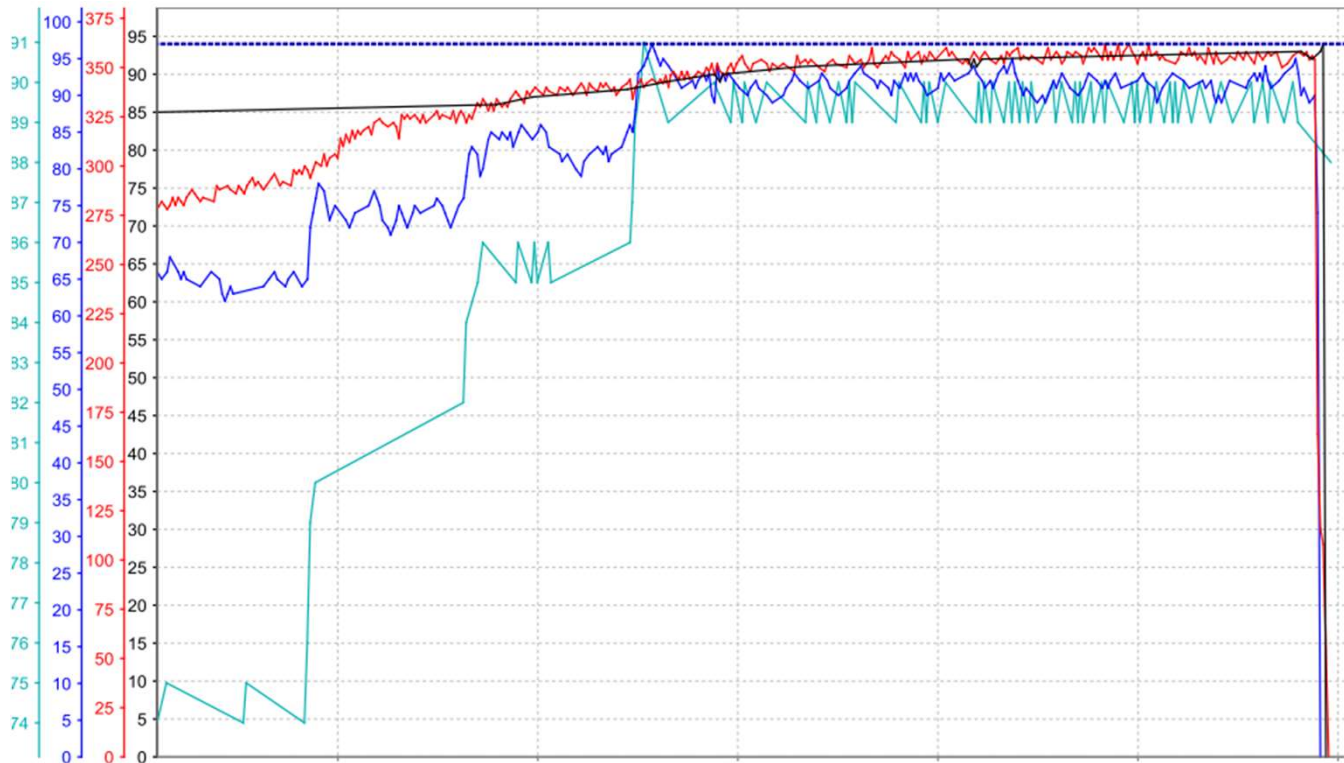
## 5. Examples

## Example 1 – Unexplained overspeed (short period zoom)

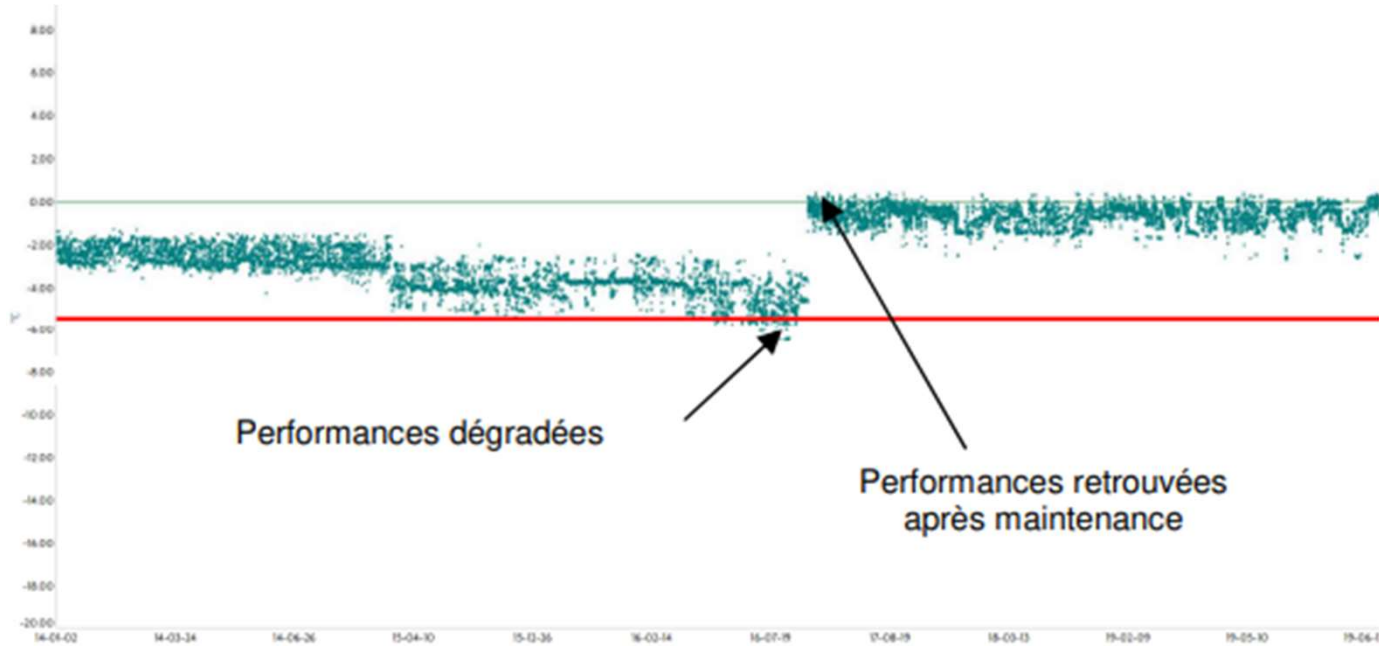


**Overspeed**

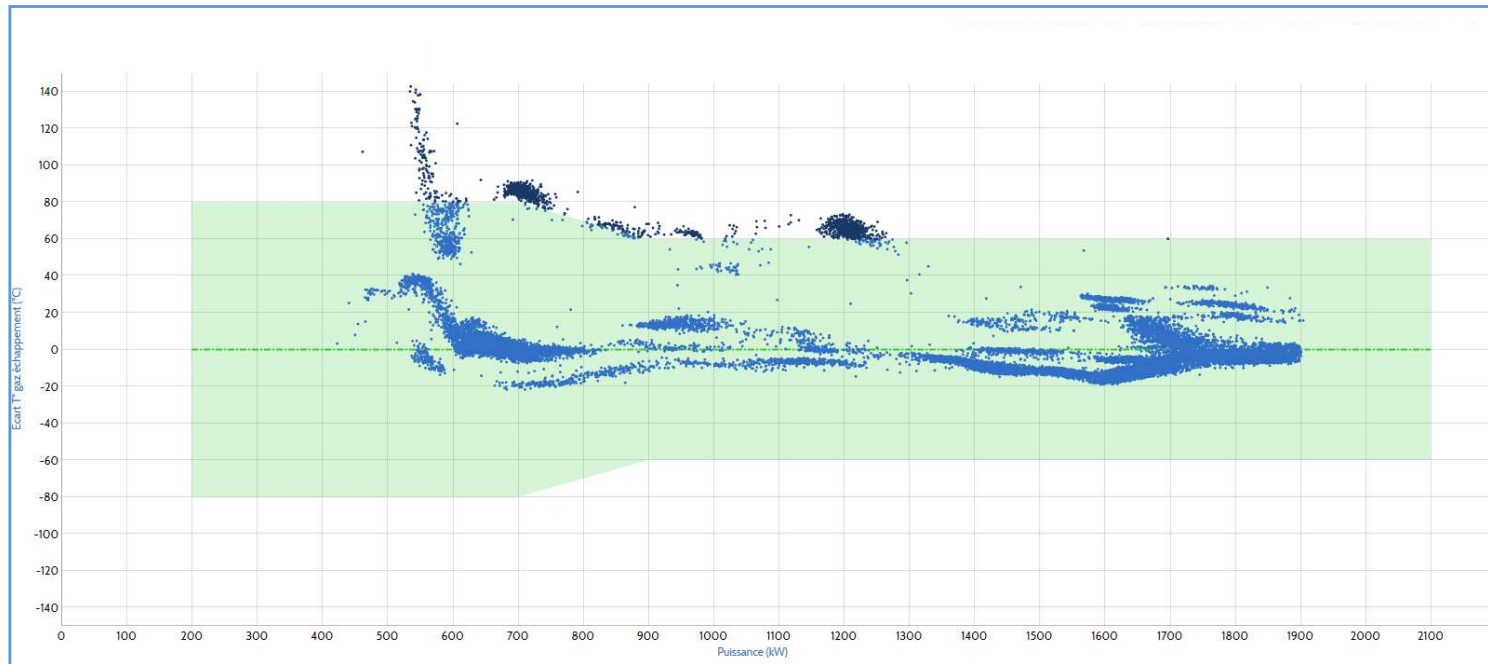
## Example 2 – Long term representation (thermal inertia and saturation)



## Example 3 – Task alert based on performance parameters (filter cleaning)



## Example 4 – Defect prediction (injectors)



## 6. Conclusions



## Conclusion

- Datavisualization for real-time access, on board or ashore
- Accelerate existing procedures : better diagnosis, better maintenance period preparation
- Challenge is to define data packs, easy to use,

=> Long term going to big data or artificial intelligence

## Questions ?

