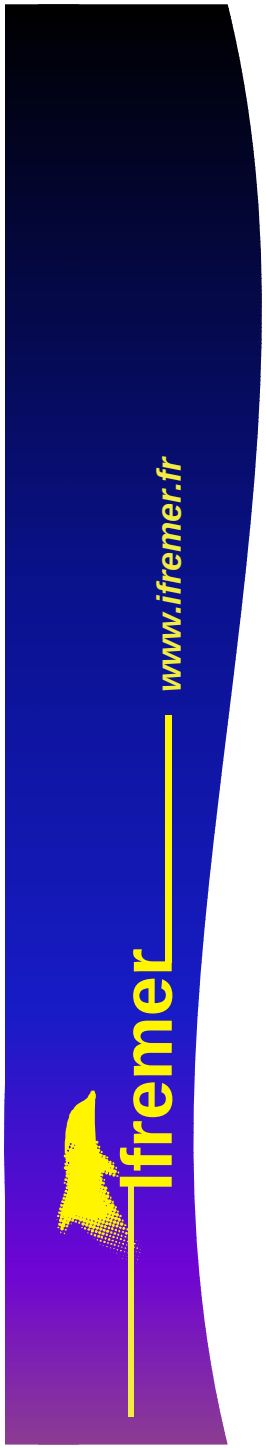

Advanced Control for Autonomous Underwater Vehicles

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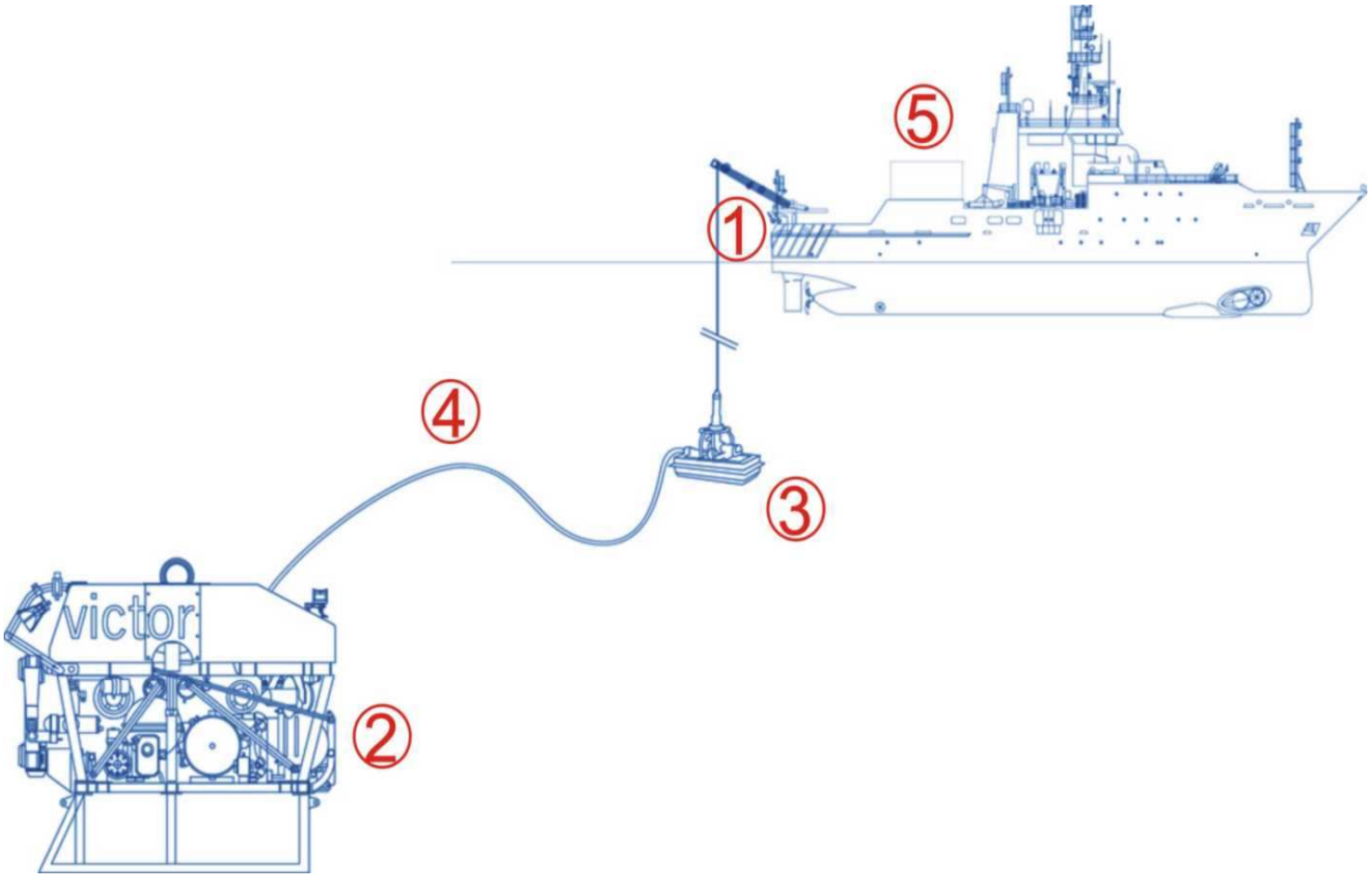
nautile - 6000m manned Sub

victor – 6000m ROV

victor – 6000m ROV system



sirene – R&D prototype

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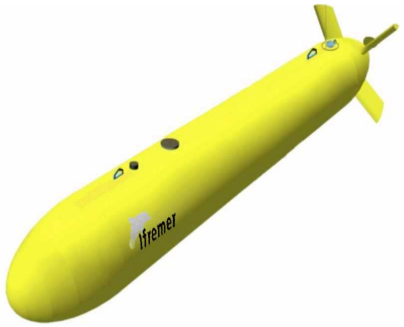
swimmer – R&D prototype

alive – R&D prototype

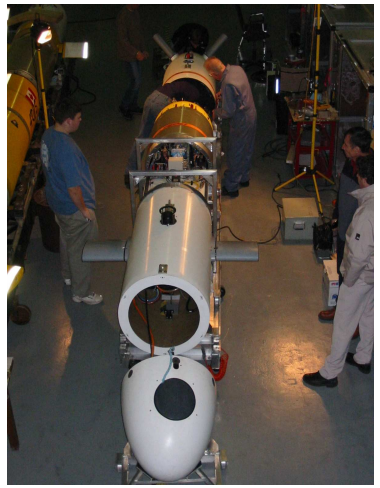
Ifremer coastal AUV program
Needs by domains

- Access to high frequency, blind areas, and optimisation of spatial-data collection cost
  - Physics/chemical survey:
    - **Access to high frequency**
    - **Access to interfaces**
  - Halieutic survey:
    - **Blind areas**
    - **Coupling with physics**
  - Mapping/Geosciences :
    - **High resolution, risk assessment , slope stability gas hydrates, canyons …**

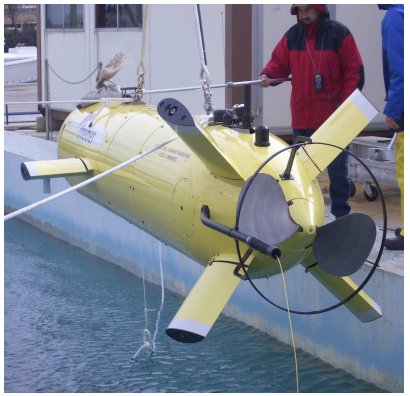
AUV for regional and local survey
High-Resolution (HR) at high speed mapping



Medium class survey AUV Aster^x



- Length 4.5m, total weight in air 793kg with 200kg payload displacement
- 3000m depth, 100km range
- Inertial Doppler and inverse USBL navigation
- Long range acoustic telemetry
- High flexibility for payload (Side-scan, multi-beam echo sounder, mono-beam sounder, sub-bottom profiler, CTD, ADCP, water sampling...)



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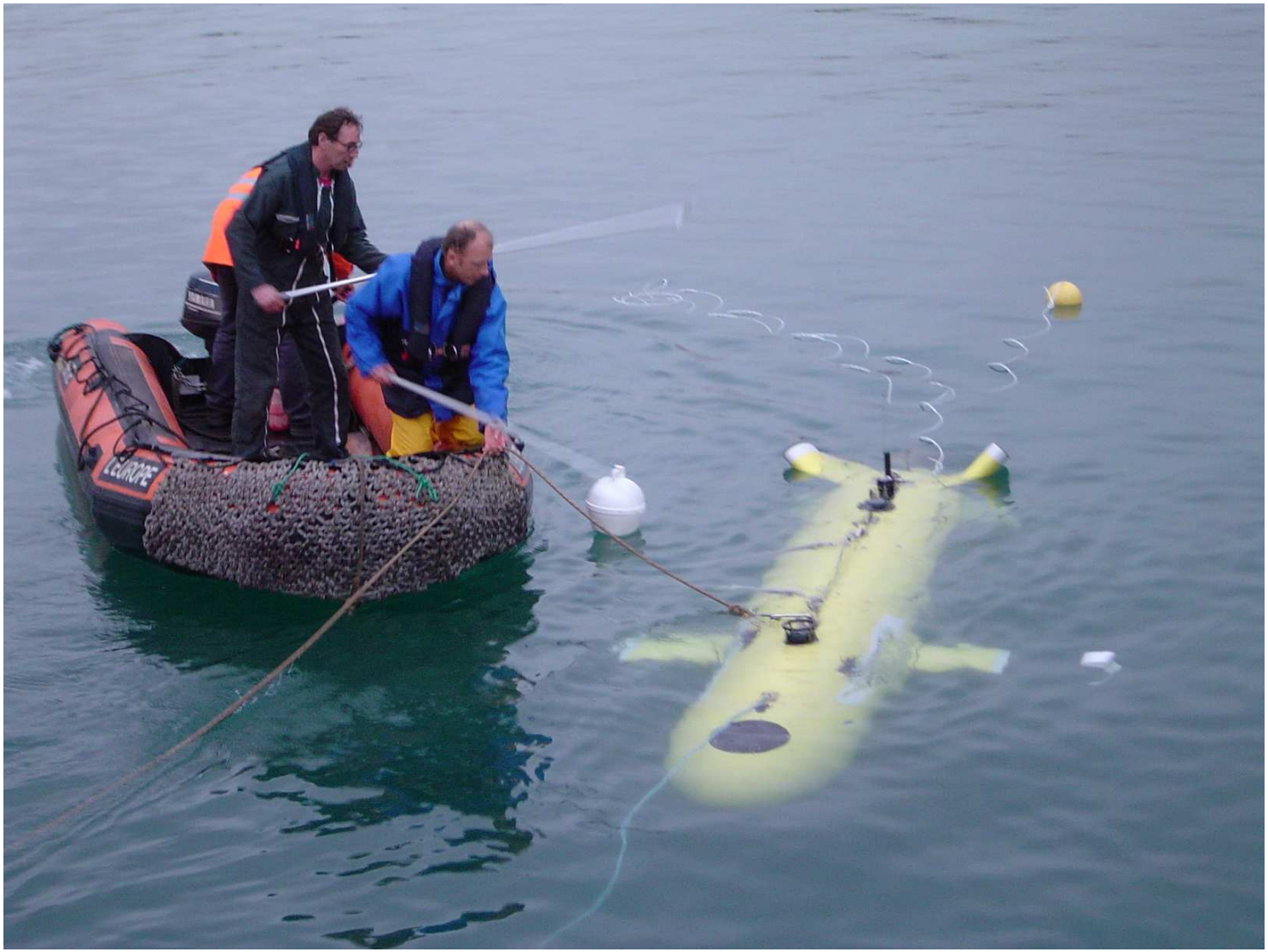
aster^{x} – 3000m AUV



AUV embedded control

Needs for improving vehicle control autonomy

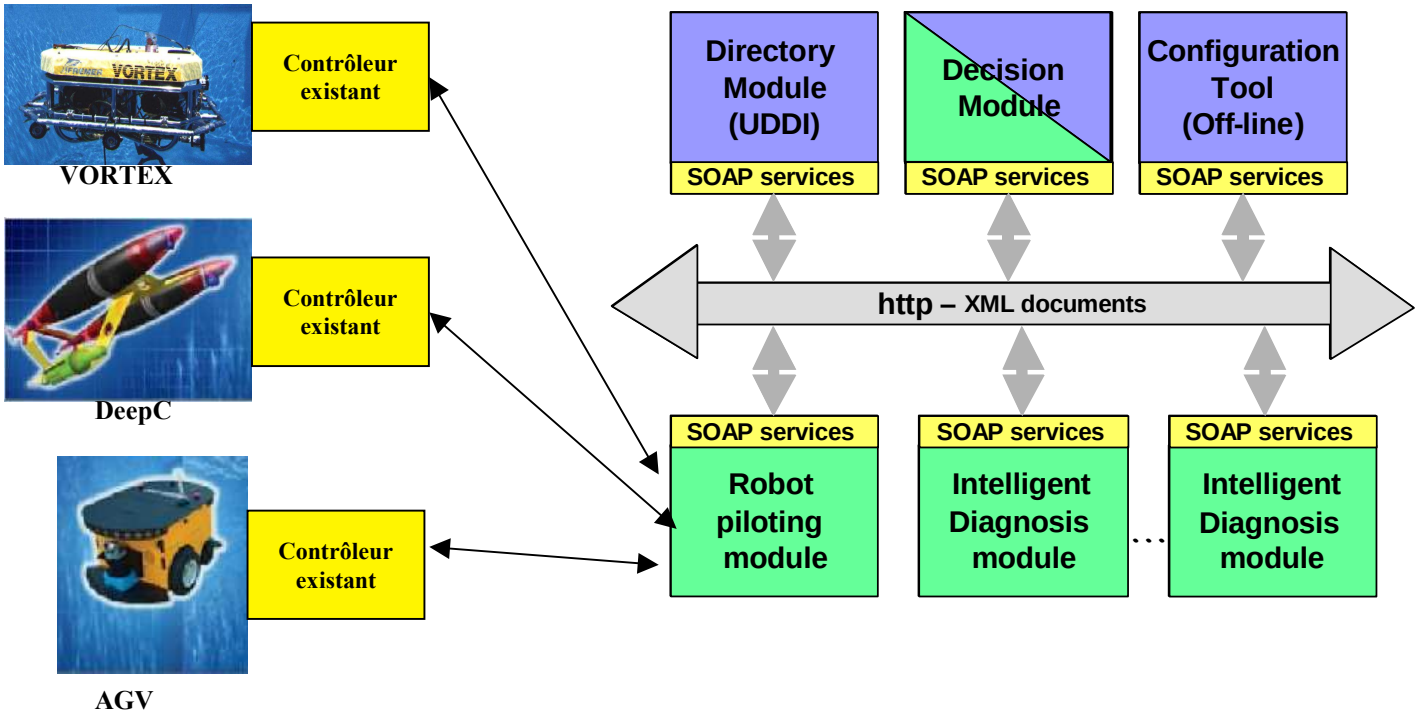
- Diagnosis
- Decision and Recovery actions
- Vehicle monitoring
- Payload monitoring
- Mission supervision

Operational objectives

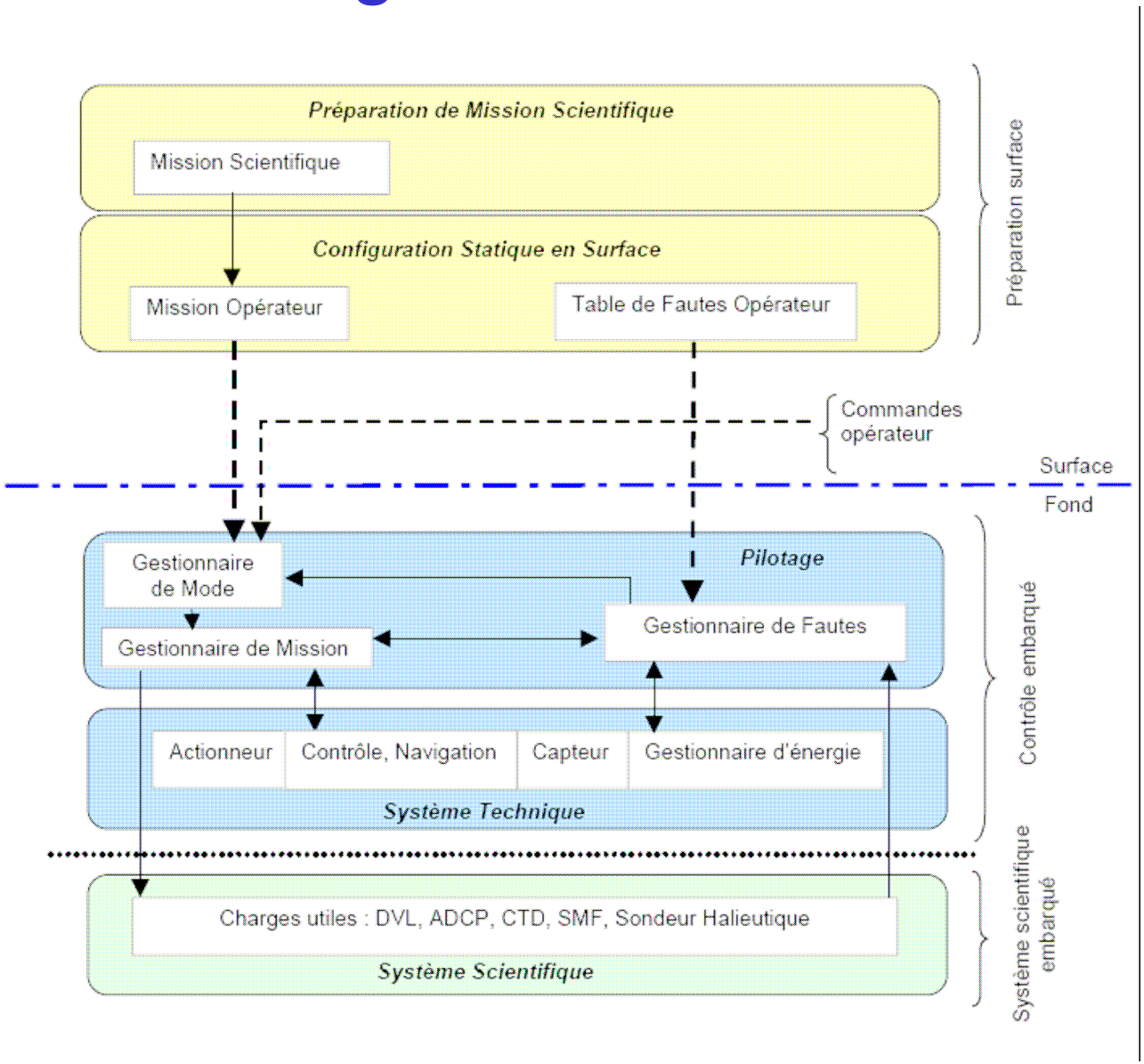
- Improve safety/security of AUV, equipment, environment
- Increase/optimise AUV performance

ADVOCATE I & II – EC projects
Research background

Design and development of modular and distributed architecture for advanced control and on-board diagnosis and decision of autonomous systems



aster^{x} existing on-board architecture



Needs for improving the existing architecture

Main needs rely on

- **Requirements for advanced diagnosis and supervision of AUV subsystems**
- **Requirements for mission supervision**

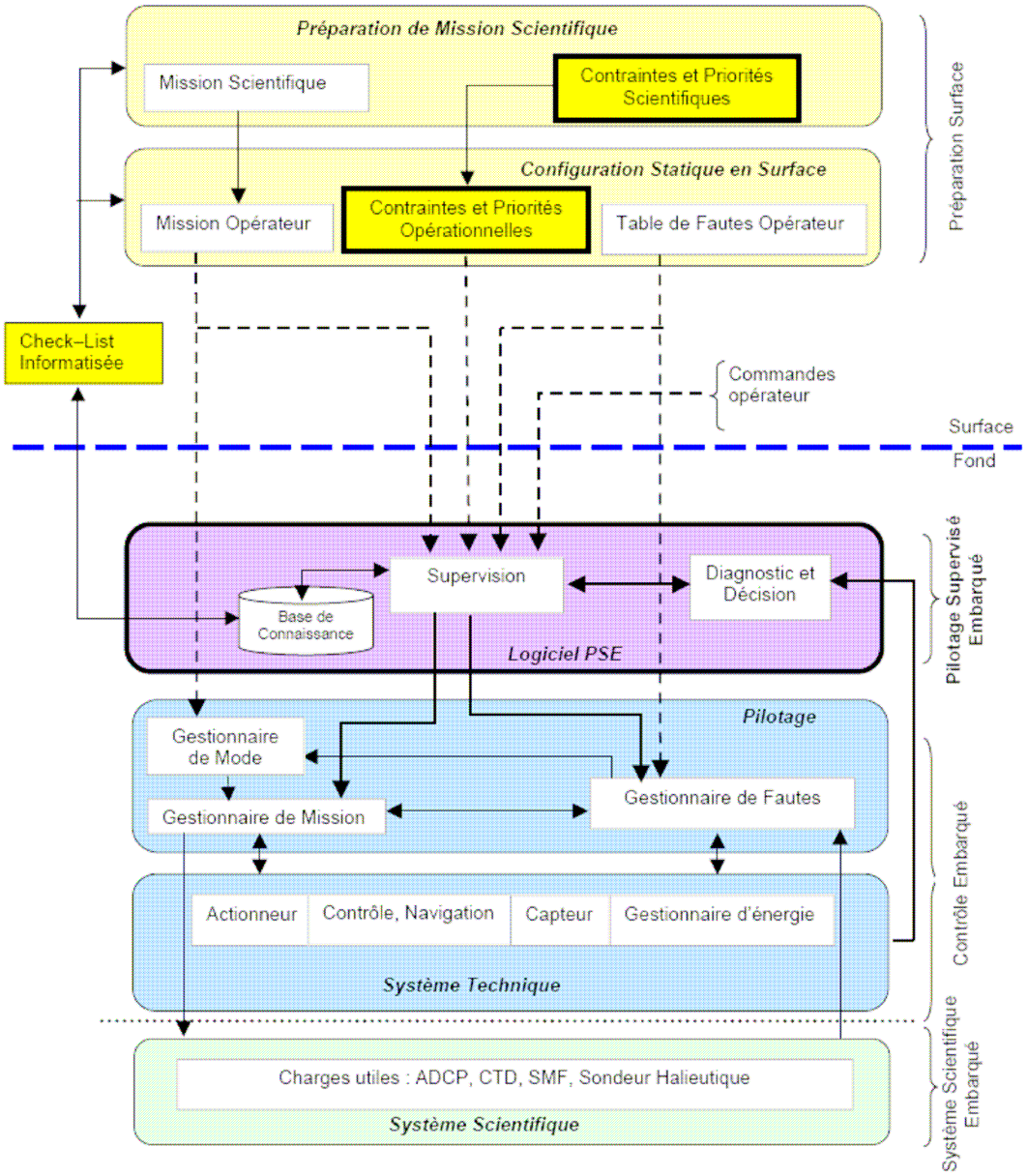
Objectives

- **Reduce/limit unnecessary mission abortion**
- **Increase reactivity at mission level**
- **Improve performance (payload supervision)**

Design of PSE module

- **PSE = « Embedded Supervised Piloting »**
  - **Built as an expert system**
  - **Handles all data available on the AUV**
  - **Integrates expert knowledge**
  - **Manipulates diagnosis and decision rules**
  - **Supervises the mission execution**
- **Capabilities of interaction on the AUV**
  - **Modification of current mission parameters**
  - **Suspension/resume of mission execution**
  - **Replacement of the mission plan**

Improved on-board architecture



The NEMO software suite

- **PSE module**
- **TOOLBOX Configuration Tool: production of rules, internal/external process, level of interaction of PSE on AUV mission management**
- **ANALYSER: exploitation of PSE logged data together with AUV logged data**
- **EYES Monitoring Tool: monitoring of PSE when communication link exists**

Perspectives

- The NEMO software suite is currently under development
- First tests of PSE module will be performed on a simulation platform of ***asterx*** .
- Progressive integration and test of PSE module on-board the ***asterx*** AUV are planned for the end of 2006