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Technical Domain / Task Number 2 6.3.1

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French strategy for monitoring AtoN

# Summary

Give a brief description of the content of the paper.

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## Purpose of the document

ENG WG1 is invited to note this information and consider its value as part of the updating of guideline G1008.

## Related documents

G1008 Remote control and monitoring of marine aids to navigation

# Background

The supervision of Aids to Navigation (AtoN) is a major priority for the French State, which is responsible for buoyage and the safety of maritime navigation within its territorial waters.

Each AtoN is subject to availability requirements depending on its importance for navigational safety. This level of availability is achieved through the implementation of appropriate technical solutions and maintenance practices. Acting as early as possible before a failure occurs helps to improve AtoN availability and is part of an efficient preventive maintenance approach. Monitoring therefore serves as a key tool to quickly detect failures and enable timely intervention.

The French monitoring strategy has developed along two complementary lines in recent years:

1. Providing AtoN managers with a methodology for selecting which AtoN should be monitored;

2. Developing a centralized monitoring application.

# French strategy for the Monitoring of Aids to Navigation

## Prioritization of AtoN to be monitored

France has approximately 7500 AtoN, of which 5400 are active. Deploying monitoring across all AtoN is neither economically viable nor relevant. A critical step in the AtoN monitoring strategy is therefore to identify which aids are the most relevant to monitor and to prioritize actions accordingly.

To this end, Cerema, in collaboration with AtoN managers, has developed a guide proposing a decision-making methodology to determine which AtoN should be supervised. This methodology is based on the analysis of two indices:

* **A strategic index**, which aims to assess the relevance of supervising an AtoN with regard to the service provided, its location, and the technical architecture in place.

Criteria used to evaluate this index include:

* + The importance of the aid for navigational safety, notably through its category;
  + The conditions and means of access to the aid;
  + The complexity of the installed equipment.
* **An operational index**, which aims to adjust (upward or downward) the strategic interest according to technical aspects of the AtoN and the local context.

Suggested criteria for evaluating this index include:

* + The presence of a trusted third party for supervision;
  + The availability of communication technology;
  + The possibility of integrating supervision into the installation.

*Note: The above list of operational criteria is not exhaustive and may be supplemented by the service manager for local reasons.*

The analysis of the strategic interest criteria results in a score between 1 and 4, corresponding to different levels:

* **Strategic Index = 1: Essential** – the AtoN must be supervised;
* **Strategic Index = 2: Recommended** – the AtoN should be supervised;
* **Strategic Index = 3: Optional** – the AtoN may be supervised in specific cases (repeated failures, intrusion, drifting);
* **Strategic Index = 4: Secondary** – the AtoN does not need to be supervised; however, supervision may still be justified for very specific local reasons (e.g., contractual requirements).

This strategic index is then adjusted by the **operational index**, which considers the specific constraints and the local context of the AtoN.

The combination of these two indices provides guidance for managers in prioritizing their monitoring actions (see Table 1 and Table 2).

Table 1 : Multicriteria analysis of the strategic index

|  |  |  |  |
| --- | --- | --- | --- |
| Criteria | | | Monitoring device |
| Category | Difficulty of access | Nature of the system |
| 1 | Indifferent | Indifferent | Essential |
| 2 | Major difficulty encountered: Mobilization of third parties or access delay too long | Complex | Essential |
| Standard or simple | Recommended |
| No major difficulty | Complex |
| Standard or simple | Optional |
| 3 | Major difficulty encountered: Mobilization of third parties or access delay too long | Complex | Recommended |
| Standard or simple |
| No major difficulty | Complex | Optional |
| Standard or simple |
| 4 | Major difficulty encountered: Mobilization of third parties or access delay too long | Complex | Optional |
| Standard or simple | Accessory |
| No major difficulty | Complex |
| Standard or simple |

Table 2 : Combination of strategic index and operational index

|  |  |  |  |
| --- | --- | --- | --- |
| Situation | Criteria | Strategic index | Actions |
| IO1  Presence of a trusted third party  ‍ | Presence of a trusted third party | IS1 (Essential) | Remote monitoring is necessary. |
| IS2 (recommended),  or IS3 (optional),  or IS4 (accessory) | Remote supervision is not necessary and is ensured by the third party. No further action is required. |
| IO2  Availability of communication networks  ‍ | Network available but high associated cost | IS1 (Essential) | Consider the budget program to be implemented to meet the strategic index. |
| IS2 (Recommended) | Consider the budget program to be implemented to meet the strategic index, and evaluate trade-offs with other divisional operations. |
| IS3 (Optional)  ou IS4 (Accessory) | No further action is required. |
| No network available | All IS | No possibility of implementing supervision. |
| IO3  Technical feasibility  ‍ | No possibility of integrating supervision equipment into an already installed device | IS1 (Essential) | Examine the possibility of replacing the installed equipment with suitable equipment (integrated or connectable supervision), or approach the manufacturer/supplier to combine a supervision option. |
| IS2 (Recommended) | Examine the budget programme to be put in place to meet the strategic index, and consider trade-offs with the division's other operations.  Contact the equipment manufacturer/supplier to find out about feasibility and costs. |
| IS3 (optional)  ou IS4 (accessory) | No further action is required |

## Centralized tool

The second component of the French monitoring strategy is the deployment of a single tool, shared by all services and interoperable with different monitoring technologies.

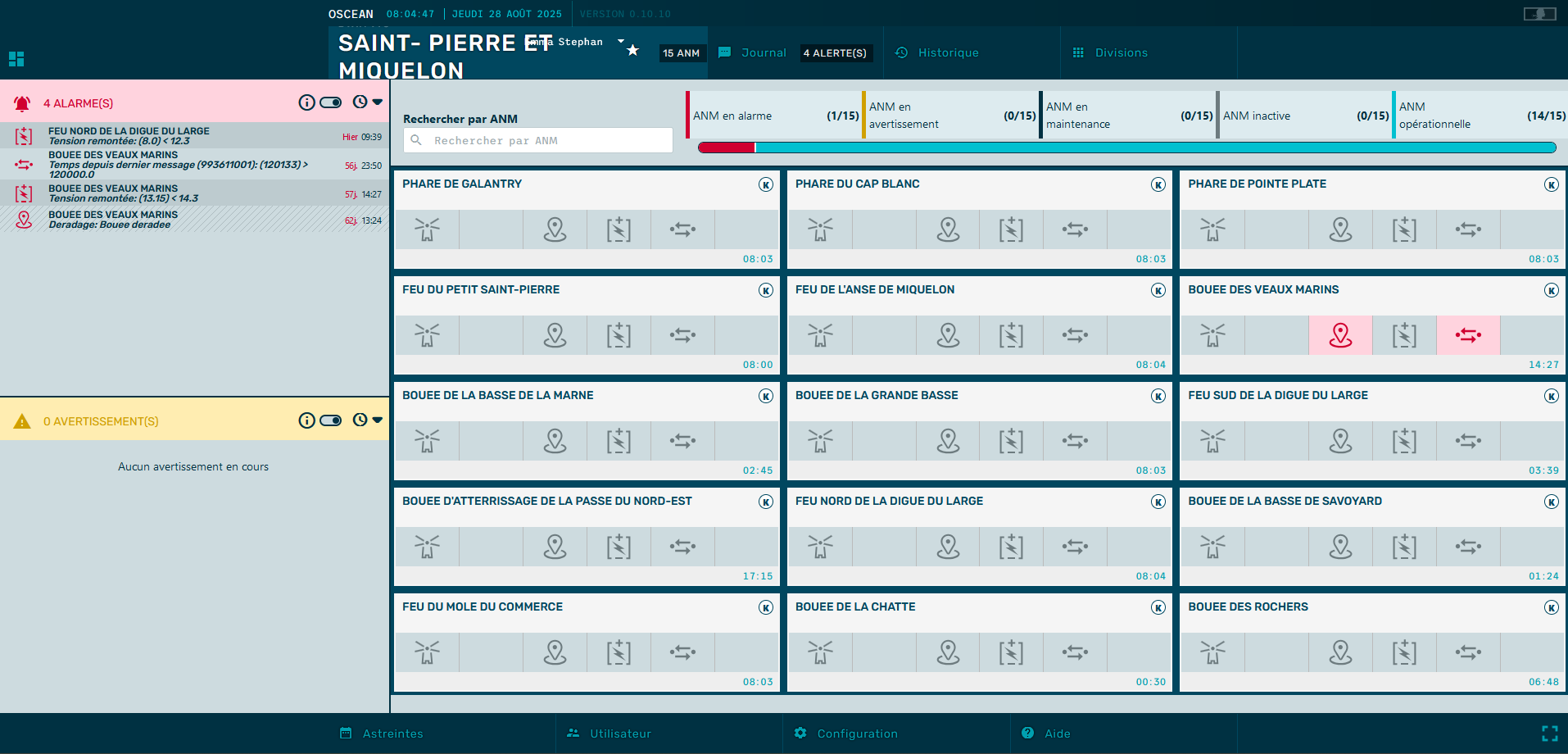


Figure 1: Dashboard view of a management service

Developed in collaboration with AtoN managers and field technicians, this tool enables real-time monitoring of supervised AtoN, alerts in case of failure, and data history analysis.

The functionalities of this tool are:

* Real-time visualization of the status of AtoN (Figure 1);
* Historical consultation and download data;
* Notification of on-call agents in case of failure (SMS and email).

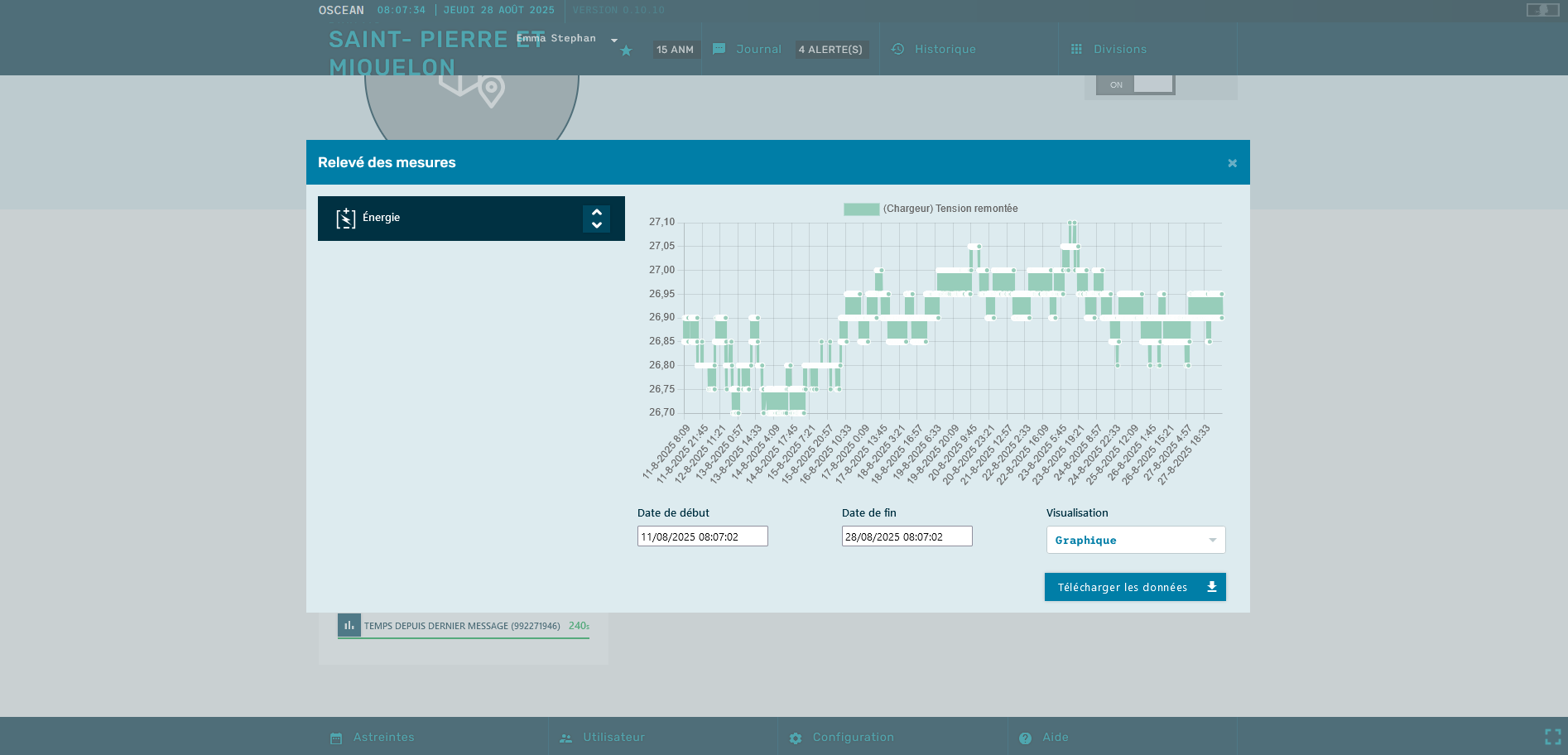


Figure 2: View of historical voltage data

Part of the information is accessible online, allowing on-call staff to check the status at any time using a simple smartphone. Additional functionalities are available through secure access on a dedicated State network. In the coming months, remote-control capability via AIS will be implemented for equipped AtoN, allowing certain actions to be carried out, particularly for isolated sites.

The tool has been designed to easily integrate new monitoring technologies in the future and offers extensive configuration possibilities so that each service can adapt it to its own needs.

# Conclusion

The French strategy for the monitoring of Aids to Navigation combines a clear methodology for prioritizing which AtoN should be monitored with the development of a centralized, flexible, and interoperable tool. This dual approach ensures that resources are allocated where monio has the greatest impact on navigational safety, while providing managers with an efficient, scalable solution for real-time monitoring and data management.

By enhancing preventive maintenance, improving fault detection, and enabling faster intervention, this strategy contributes directly to the reliability and safety of maritime navigation. It also provides a framework that can be continuously adapted as new technologies emerge and operational needs evolve.

# References

[1] G1008 Remote control and monitoring of marine aids to navigation

[2] Niveau de service des ANM – Guide méthodologique sur la supervision, Cerema, 2025

# Action requested of the Committee

The Committee is requested to:

1. note this information and consider its value as part of the updating of guideline G1008.
2. consider the value of adding the principle of a methodology for priorising AtoN to monitor in the related model course

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-2)
2. Leave open if uncertain [↑](#footnote-ref-3)