IALA GUIDELINE G1077

IALA Guideline G01077 gives guidance on the maintenance of AtoN and information to help develop an adequate maintenance strategy. Maintenance is a key factor to ensure that Aids to Navigation equipment performs and is available in any given moment, according to the levels required to a safe and efficient navigation.

This maintenance strategy depends in high measure of the availability objectives established for each AtoN unit, that is defined based on the criticality and category of the AtoN.

GUIDING PRINCIPLES FOR MAINTENANCE STRATEGY

AtoN service delivery is composed by:

User requirements

System design

System maintenance

This article and the 1077 Guideline are intended to address maintenance, however there is a strong interrelation of maintenance with requirements and design. Equal importance must be placed in each of the 3 phases of the Aids to Navigation delivery to provide a signal to the mariner at an acceptable cost to the Authority.
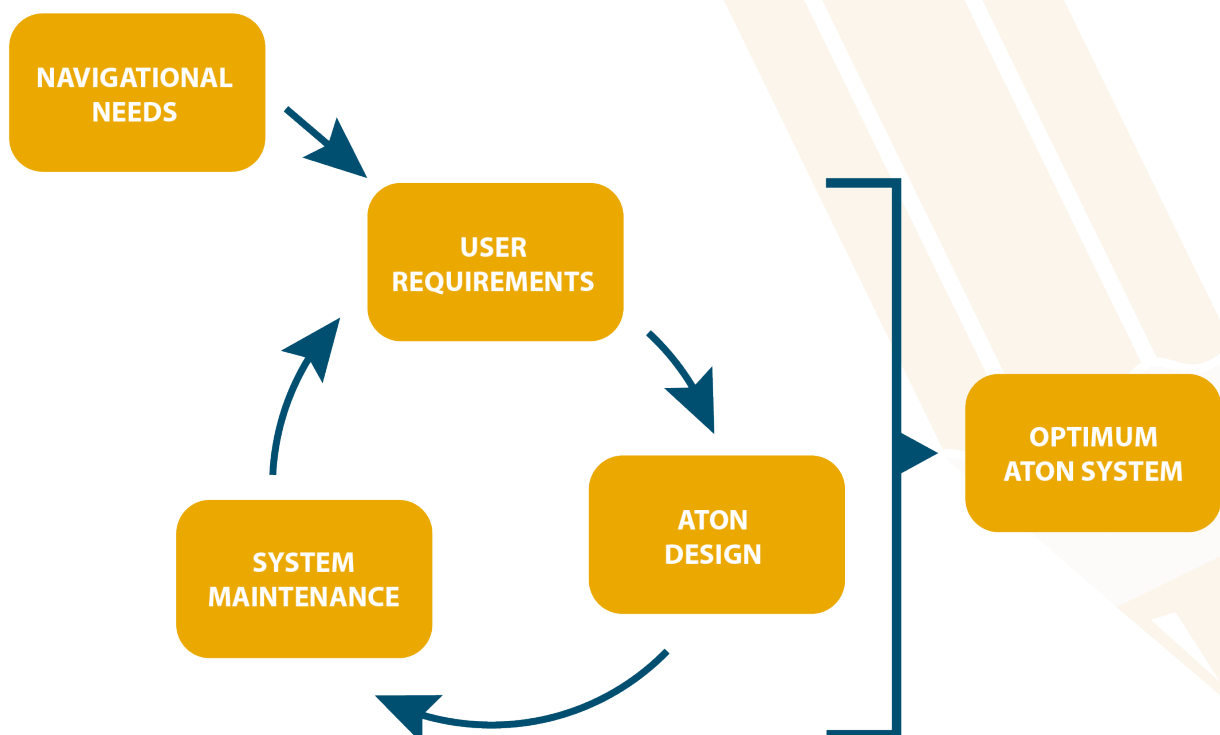
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PRINCIPLE 1:
MINIMISE THE COST OF OWNERSHIP

PRINCIPLE 2:
DESIGN FOR MAINTENANCE

PRINCIPLE 3:
MINIMISE IMPACT ON THE ENVIRONMENT

PRINCIPLE 4:
COMPLY WITH LEGISLATION
AND INTERNATIONAL STANDARDS

PRINCIPLE 5:
CONSIDER HEALTH AND SAFETY OF WORKERS AND PUBLIC

PRINCIPLE 6:
ASSESS AND IMPROVE PERFORMANCE

Maintenance philosophies are mainly divided between corrective maintenance and preventive maintenance. Corrective maintenance **(CM)** is carried out after the failure of an item or when performance drops below certain limits. Preventive maintenance is intended to prevent the failure or degradation in order to maintain an adequate performance over time. This type of maintenance can be carried out at planned intervals **(PM)** or according to condition based criteria **(CBM).**

CORRECTIVE MAINTENANCE (CM)

Corrective maintenance is required when a item has failed or has degraded below acceptable values to restore the equipment to a working order. This maintenance philosophy prevents the economic cost of continuous maintenance operations, resulting in a lower maintenance cost, however, is easy to see its limitations. Failure of equipment can lead to a unacceptable loss of availability, especially if "response-time" of the maintenance crew is long. Additionally, this can lead to a high personnel and logistics costs, due to the need to have a maintenance team ready at almost any time. Finally, the risk of vessel accidents can be increased from a non-functioning AtoN so this is not viable in high category AtoNs or the ones that are key for safe navigation.

MSM

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PLANNED MAINTENANCE

Planned maintenance implies routinely inspection and servicing operations to prevent breakdowns in AtoN equipment. As it is impossible to inspect the equipment continuously, time intervals should be established (based on working time, number of cycles, etc) according to risk analysis, manufacturer recommendations or historical data. The term "Intelligence based maintenance" is an extension of planned maintenance, which implies the use of site-specific conditions, historical performance data, historical maintenance data and trend analysis are taken into account to adjust the maintenance intervals.

CONDITION-BASED MAINTENANCE (CBM)

This type of maintenance is based on the evidence of need and equipment conditions, observing the state of the system (condition monitoring) will permit prioritize and optimize the inversion of maintenance resources. Such system only acts when the operation are really necessary. Developments in recent years have allowed for the instrumentation and real-time monitoring of the equipment and data analysis shall allow to make informed decisions. Visual inspections and physical measurements are also important tools to take into account.

The following diagram is a useful tool to decide the appropriate methodology (or mix of methodologies) appropriate to their particular equipment and system environments.