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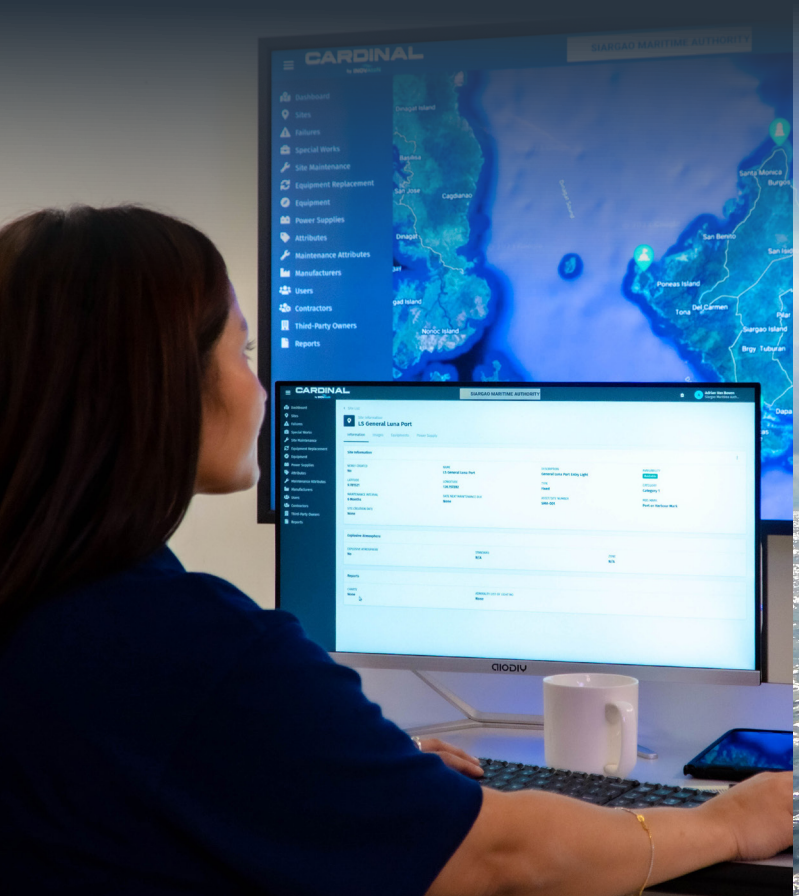
SOFTWARE for Marine Aids to Navigation (AtoN)



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CARDINAL - The complete Marine Aids to Navigation (AtoN) software package for through-life asset administration, asset maintenance and monitoring of IALA/IMO compliance requirements.

CARDINAL has been developed for any organisation that owns or manages and maintains Marine Aids to Navigation (AtoN).

A specialist software platform, CARDINAL has been developed as an AtoN asset and compliance management system, that identifies and responds to the challenges associated with managing AtoN, providing a holistic solution that meets the needs of the industry.

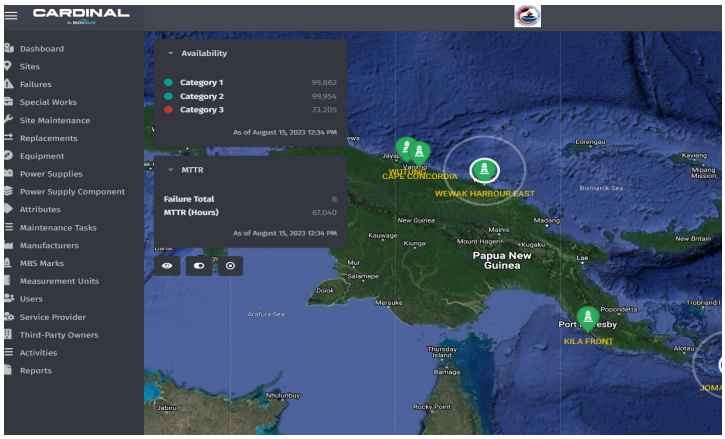
CARDINAL provides the user the complete suite of tools - a comprehensive site database, a maintenance planning and implementation module, the ability for technicians to carry out remote site reporting and recording that automatically syncs to the database, an automated method of generating and internally distributing MSI, an efficient procedure for failure response, automated tracking of availability performance, and a highly configurable and integrated reporting portal.

These features make CARDINAL an essential tool for any organisation, not only in terms of creating a more efficient and effective asset and asset maintenance recording system and improving the maintenance process overall, but also for ensuring that AtoN services are being delivered in compliance with international standards.

The User Interface

CARDINAL is intuitive, extremely user-friendly and utilises a map-based system for an overview of the status of all AtoN sites in the system. Selecting an AtoN site via the geographical interface, the system opens to a sub-window which outlines general site information with links to individual equipment and maintenance information plus all historical data.

Designed for ease of use, All functions are easily accessible from the main screen, with AtoN status easily visible through the use of different icons and a dashboard showing current availability and MTTR performance.



THE USER INTERFACE - KEY FEATURES

- Web-Based Application.
- Geographical information system which shows the status of each AtoN site, allowing access to site information at the click of a button..
- Simple and intuitive menu system with all functions and modules easily accessible from the main screen.
- Easy to access site information which includes all equipment installed on a particular site with historical records.
- Availability and MTTR widgets showing current status.

Asset Management

CARDINAL's functions are built around the provision of an AtoN asset database that records all site-related details and has the ability to historically record all changes and other events associated with the AtoN site.

CARDINAL recognizes that AtoN infrastructure is unique, and differentiates between fixed and floating structures, and further allows for the recognition of AtoN type in accordance with *IALA Recommendation R1001 - The IALA Maritime Buoyage System*. The database also records other key AtoN characteristics such as, but not limited to, range and rhythmic flash character.

Likewise, the database allows for recording of:

- The details on structure types, type of material and dimensions, and mooring system particulars.
- Details of AtoN equipment contained within an AtoN site including Lanterns, AIS AtoN, Racons, Power Supplies, Sector Lights etc
- Specific details on AtoN equipment including Make, Model, Serial Number, Installation Date and other equipment-specific information.

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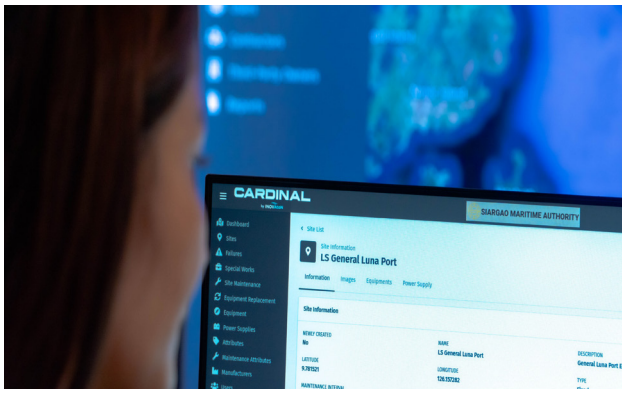
Site Management and Record Keeping

CARDINAL provides comprehensive recording of all activities undertaken at each site and storage of full historic data.

This includes planned maintenance, one-off special works, equipment replacement, failure response, navigational warnings and a site by site document repository.

All records are easily added to the database through manual entry of data on the web application, or via the fully integrated android application.

A highly configurable reporting portal provides instant access to a large range of reports, accessing data and presenting information in the required format.



Site Reporting and Data Syncronisation

CARDINAL offers two modes of reporting and data entry, through the main user portal, or through an integrated android application on a ruggedised technician's tablet.

Use of the maintenance tablet allows for prompted reporting on-site, and automatic syncing to the database, either immediately or when internet connectivity is available. The tablet pre-loads automated report forms specific for each site and user, and requires no internet connection during usage, with data synchronization occurring when an internet connection becomes available, making it a true remote-site maintenance recording tool.

This negates the often-experienced disconnect between a technician undertaking work on-site and later completing reports off-site, which is a common issue faced on remote sites.

Maintenance

Maintenance ensures that an AtoN is kept in optimal operating condition, reduces the possibility of failures and maximises its useful lifespan, thereby reducing the total through-life cost.

The scheduling, tracking and recording of specialist maintenance on often remote and wide-spread assets is challenging. CARDINAL offers a comprehensive maintenance module, with total activity recording. Whether it is scheduling of routine maintenance, or one-off special works, everything can be scheduled and tracked.

Some of CARDINAL's key maintenance module features include:

- Allocation of customised maintenance intervals on a site by site basis, allowing for indiviual site maintenance schedules.
- A prompting and reminder system for upcoming or lapsed maintenance visits.
- Recording of maintenance on any sites or equipment including full reporting with photographs.
- Maintenance can be entered into the system via the web application or through the use of a ruggedised tablet running a fully integrated android maintenance application with pre-loaded site-specific maintenance forms.
- Assigning of maintenance to teams, individual technicians or contractors and other third parties.
- The ability to document and record any issues identified on site that require additional attention, and forward tracking and reminding for future site visits.

KEY FEATURES

- Customisable and configurable maintenance intervals and scheduling.
- Record any maintenance carried out on sites / equipment including full reporting with photographs and the ability to create individual site maintenance schedules.
- Maintenance can be entered into the system via the web application or through the use of a ruggedised tablet running a fully integrated android maintenance application with pre-loaded site-specific maintenance forms.
- Intuitive process for assigning maintenance and site works activities.
- All records easily accessible via the reporting portal.

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Special Works

CARDINAL provides a structured and scheduled method of maintenance management, but also recognises that one-off site visits outside of normal maintenance schedules are sometimes required, for upgrades, rehabilitation or for emergency purposes. This is referred to in CARDINAL as Special Works.

CARDINAL allows for the scheduling and management of these types of site visits, including the assisgnment of technicians or contractors, allocation and scoping of works to be undertaken and full on-site reporting and recording.

The flexibility of the special works module allows for use on an ad-hoc basis, as a response to issues identified during scheduled maintenance visits, or as part of a larger planned capital works and upgrade program.

Equipment Management

CARDINAL recognises that AtoN equipment is complex and diverse, requiring everything from marine lanterns, RACON, communication equipment, through to power supplies and other integrated technologies, such as AIS and remote monitoring.

CARDINAL differs from a typical asset management system in that it allows for AtoN specific input of equipment.

All equipment has different operating parameters and expected life spans, and the planning for replacements is an ongoing administrative challenge.

CARDINAL stores details of equipment that is installed on each site, the allocation of replacement dates, an ability to record the details of all changes and replacements and a comprehensive reporting capability.

This allows AtoN owners and operators to forward plan replacements and purchasing and ensure that budget allocation is precise and informed.

KEY FEATURES

- Scheduling, tracking and recording of special works and one-off site visits.
- Failure and outage occurrence and response tracking and recording.
- Automatic integration of failure response time with avaialability performance tracking.
- Flexible assigning and allocating of special works and failure response to technicians or contractors.
- AtoN-specific equipment recording, replacement date scheduling and tracking.
- Fully customisable equipment replacement reports for planning and budgeting.

Failure Response Management

AtoN owners and operators know that failures occur unexpectedly, increasing maritime safety risk, and unfortunately, their exposure to liability. Due to the nature of AtoN failures, the response is often unplanned and ad-hoc.

The CARDINAL failure reporting module allows for a simple failure registration process, ensures that the issuance of MSI for marine warnings is automated, and allows for a planned, tracked response process, that also utilises the integrated android tablet for on-site reporting and recording of the rectification process.

CARDINAL automatically adds the failure to the availability reporting module, thereby seamlessly integrating the various tasks and processes that need implementation upon recognition of a failure.

Likewise, at the close-out of a failure response, CARDINAL automatically follows the same sequences in reverse, by issuing notification an AtoN has been restored, closing off the availability calculation, providing data for future improvement, and storing reports and records of the response process.

This whole-loop internal software process allows AtoN owners and operators to concentrate on the most critical part of the failure rectification process, which is planning the logistics and resources required to ensure the AtoN is operational again in the shortest possible time.

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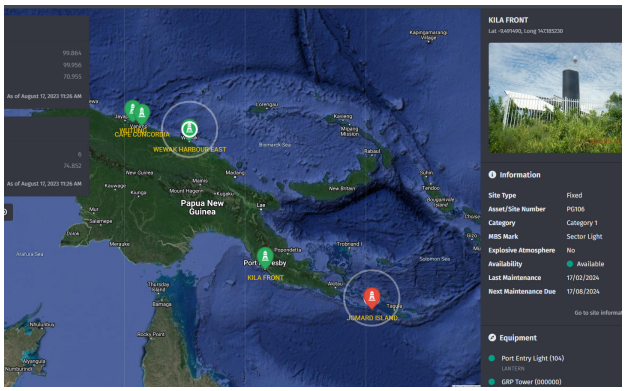
CARDINAL helps monitor compliance of AtoN to international standards.

Whether a national AtoN authority, a state or local government, a port authority, or a private operator of AtoN, there is an obligation to effectively manage AtoN assets, to reduce costs and to meet national and international obligations. Most importantly, there is a requirement to effectively mitigate maritime safety risk, and contribute to ensuring movement of vessels are safe, expeditious and cost-effective while protecting the marine environment.

There are various international obligations that organisations must observe for the provision of AtoN to ensure the highest level of safety of navigation is achieved. The IMO's 'Safety of Life at Sea Convention (SOLAS)' Convention provides information that is implicit to the requirements for AtoN in Chapter V, Regulation 13, and refers to guidance provided by the 'International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)'.

There are also levels of national and regional legislation, organisational mandates and established levels of service to consider.

CARDINAL was developed with a number of automated modules that provide users with the tools required to track their compliance and effectively and efficiently provide the highest level of AtoN management and safer outcomes at sea.



AtoN Type and Categorisation

CARDINAL ensures all AtoN are correctly identified per type, as per *IALA Recommendation R1001 - The IALA Maritime Buoyage System*. This standardises terminology and classification of AtoN types with established international standards.

CARDINAL also recognises the importance of assessing and identifying the navigational significance of AtoN, and allows for categorisation of AtoN in accordance with *IALA Recommendation R0103 on Categorisation and Availability Objectives*.

This further allows for identification and tracking of availability objectives, a critical high level obligation for AtoN owners and operators.

Availability Performance Tracking

The reliability of AtoN is perhaps the most important, and biggest challenge faced by AtoN owners and operators. Operational reliability is perhaps best described by IALA as availability, which by its definition, is the "probability that an AtoN or system of AtoN, as defined by the Competent Authority, is performing its specified function at any randomly chosen time. This is expressed as a percentage of total time that an AtoN or system of AtoN should be performing their specified function".

IALA Recommendation R0130, on Categorization and Availability Objectives for Short Range AtoN, provides very specific normative guidance on categorising AtoN, and assigns availability objectives for their performance. *IALA Guideline G1035 on Availability and Reliability of AtoN*, then goes on to provides theoretical and practical examples on how to track and calculate availability.

CARDINAL was developed with a module to automate that process, allowing for categorisation of AtoN and the automatic calculation of availability based on failure reporting module entries. Availability performance is shown in real-time, via an on-screen widget and full availability performance reports can be produced with the click of a button.

CARDINAL also offers Mean Time to Repair reporting, which can provide AtoN operators and owners important insight into the amount of time being taken to respond to and undertake the rectification of AtoN repairs, which can be used for improving processes and driving efficiencies.

The CARDINAL availability module is fully configurable, allowing authorities to customize how failures are handled and what is included in availability calculations and reporting.

KEY COMPLIANCE FEATURES

- Maintenance and upkeep of a National AtoN Register of AtoN and provision of summaries of updated, key information for all AtoN sites.
- Categorisation of AtoN in accordance with IALA Recommendation R0130.
- Automatic issuance of key information for navigational warnings when new AtoN are established, when changes are made or when failures are experienced, compliant with the Revised Joint IMO/IHO/WMO Manual on Maritime Safety Information (MSI)..

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Maritime Safety Information (MSI)

There are several high-level international obligations that connect the operation of AtoN with the issuance of MSI to all those concerned.

SOLAS V Regulation 4 states that that whenever there is information regarding a danger to safe navigation it should be "promptly brought to the knowledge of those concerned and communicated to other interested Governments", whereas SOLAS V, Regulation 13 reiterates this at an AtoN-specific level, stating that Contracting Governments undertake to arrange for information relating to aids to navigation to be made available to all concerned".

Whilst the responsibilities for issuance of AtoN related MSI are often shared by different government organisations, the responsibility for providing the information still rests with the AtoN operator or owner.

CARDINAL recognises the challenges associated with this and automatically generates content for marine warnings, for a number of different scenarios, whether new AtoN are installed or removed, changes are made to existing AtoN or there are failures or other issues that prevent an AtoN from performing its specified function.

The content generated by CARDINAL complies with IMO circular *MSC.1/Circ.1310/Rev.1, the Revised Joint IMO/IHO/WMO Manual on Maritime Safety Information (MSI)*.

This automated capability reduces the time and administrative input required to draft and then issue this information, and avoids issues where there is a lapse between occurrence and notification, or there are errors in the manual transcribing of data.

Site Information and AtoN Registers

CARDINAL also recognises the importance of maintaining up to date information on AtoN sites and infrastructure, for use in official navigational publications, such as lists of lights and nautical charts, and MSI in general.

Due to the complexity and variety of AtoN sites, this can be an administrative challenge.

An AtoN register is a key tool for AtoN owners and operators in maintaining the level of service and identifying and documenting all AtoN in a defined area of jurisdiction.

CARDINAL has the ability to automatically produce a register of all AtoN, in a comprehensive list that contains all the information pertinent to use in navigational publications. This information is available at the click of a button.

Likewise, CARDINAL can automatically produce current, updated details on an individual AtoN site at any given time, with the option to include only Aton-related information, or inclusive of comprehensive list of the equipment installed on site.

KEY COMPLIANCE FEATURES

- Categorisation of AtoN in accordance with IALA R0130.
- Automated tracking and reporting of availability performance in accordiance with IALA R0130.
- AtoN classification in accordance with the IALA R1001.
- Tracking and reporting of actual and historical Mean Time to Repair (MTTR) statistics.
- Fully configurable, easy to access performance reporting

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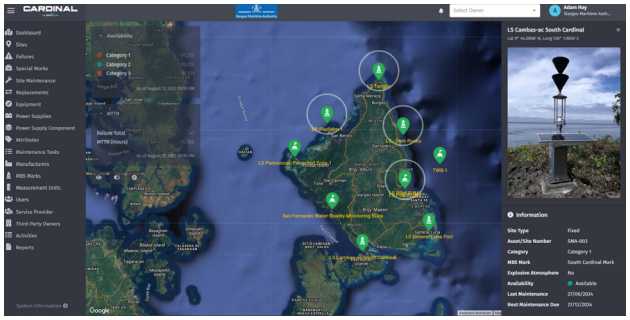

CARDINAL is a fully flexible, configurable software platform that can be customised to suit any user's requirements.

Delivery of AtoN services can be complex in terms of logistics and management of resources and personnel.

CARDINAL can be configured to take into account the different methods of AtoN delivery and maintenance, including the use of internal technicians or teams in multiple regions and different third party contractors or service providers.

With an unlimited cap on the amount of system users, CARDINAL also has a diverse range of user permissions, allowing management to manage the level of systerm interaction by all personnel and to restrict access where needed.

Tasks and responsibilities can be assigned efficiently and easily, with all remote maintenance tablets white-listed to the system and to specific personnel or technicians.

The design and structure of CARDINAL allows for varying levels of user-specific configuation. Configuration is done in consultation with the client upon initial setup of the system.

Hardware

System hardware can be supplied with the CARDINAL software system, in any quantity or configuration required, in order to set up simple work stations or comprehensive control centres.

Operator PCs can be supplied with the system, fully configured and system-ready. Wall-mounted LED monitors can also be supplied, complete with configured mini-PCs, in any quantity and layout required.

The ruggedised maintenance tables are configured and white-listed to integrate with the system, according to the user configuration specified by the customer. Maintenance tablets are ruggedized, in order to withstand the rigors of working on site in challenging conditions in exposed marine environments.

KEY SOFTWARE FEATURES

- Full email support and escalation to direct remote support for faster resolution when required.
- Continual development cycle, with bug fixes and additional features / enhancements to be added in future CARDINAL builds.
- Data input training for clients' users

SYSTEM SECURITY

- Secure login into the web application.
- Comprehensive User roles and permissions to enhance internal client system security and data integrity with System Audit Logging.
- Data is secure and encrypted on reputable hosting services.
- Maintenance Tablets are white-listed to the application, password protected and configured for access to technician-specific data.

OPTIONS & ACCESSORIES

- Ruggedised Maintenance Tablet fully configured with the Cardinal Android Application and Mobile Device Management software.
- All-in-One Operator PC, complete and fully configured.
- Wall-mounted monitor complete with mini-pc, complete and fully configured.

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CONTACT US FOR MORE INFORMATION

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