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25-31 May 2014

AIDS TO NAVIGATION KNOWLEDGE AND INNOVATION

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BEST PRACTICES

Best practices

Best practices Session

Chair: Mr. Eric Vassor
CEREMA, France

BP1 Improving daytime visibility of some buoys in Santander Port.
Authors: Mr. Carlos Calvo, Mr. Luis Álvarez.
Port Authority of Santander, Spain

BP2 IVEF implementation in polish National Maritime Safety System
Authors: Mr. Artur Baranowski, Mr. Jan Moltkowski, Mr. Michal Burka.
Sprint, S.A., Poland

BP3 Utilisation de sources lumineuses a LED dans les optiques traditionnelles
Author: Mr. Yves-Marie Blanchard.
CETMEF, France

BP4 Handbook for Nautical Studies
Author: Mr. Ernst Bolt.
Ministry of Infrastructure and the Environment, The Netherlands

BP5 How to reduce bad habit in VTS operators
Author: Mr. Carlos Fernández Salinas.
Spanish National Agency for Maritime Safety and Rescue, Spain

BP6 AtoN's remote monitoring and AtoN's remote control with AIS messages with a dedicated low cost coastal Station
Author: Mr. Pierre-Yves Martin.
CETMEF, France

BP7 Dynamic Chart Overlays to maximize the safety of navigation and assist in contingency planning
Authors: Mr. Jonathon Pearce, Mr. John Finch.
OMC International, Australia

BP8 Handling of echoes using VoIP technology in case of multiple shore reception of maritime communications
Authors: Mr. Romain Gallen, Mr. François Bajard-Jacobs, Mr. Patrick Doaré, Mr. Thierry Le Poder. CETMEF, France

BP9 The use of AIS in a mixed area
Author: Mr.Jeffrey Van Gils.
Rijkswaterstaat Water, Traffic and Environment, The Netherlands

BP10 Reparation d'une tourelle en mer a l'aide de beton fibre ultra performant (BFUP)
Authors: Mr. Nicolas Fady, Mr. Emmanuel Denarie. ETMEF-DT/TSMF/PIE, France

EXPERIENCES

18th. IALA CONFERENCE
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BEST PRACTICES SESSION

Title	Improving daytime visibility of some buoys in Santander Port
Author	Carlos Calvo
Co-author	Luis Alvarez Pedrero
Experience objective	Decision to carry out reasonable solutions in
Problem to be addressed	Some of the headframes of plastic buoys weren't enough wides and so it's daytime visibility was poor.
Equipments or services involved	Aids to navigation techinicians and some colleagues from mechanical workshop.
Actions	Design, measure, drill, and assembly the plates to the buoy
Results achieved	An increased daytime visibility of the buoys modified
Acquired knowledge	Find a good and cheap solution to an ATON problem
Resources saved (if apply)	

The geographical features of the Bay of Santander, where the port is located require almost constant dredging of the main channel for accessing boats up to the interior berthing docks. This configuration requires a concentration of lateral marks, mainly buoys, greater than most of ports. To get a better idea, we're talking over 30 buoys in the main channel and another 20 in secondary sections.

The lifetime buoy varies depending on the material, steel, plastic, etc.. but there is also a technological factor in deciding what type of format is appropriate at all times. The substitution is usually gradual, choosing each time the buoy type that fits the needs and reasonable cost-benefit balance. Thus, gradually, over time, there are different models from different manufacturers also. With the advent of the self-powered lanterns, the body of the buoy don't need to be as robust as the previous ones which had to endure external solar panels large, so that a cheaper model with floating plastic and a headframe lighter was chosen because only has to support the weight of a little lantern whose weight may vary between 2 and 15 kilos. The choice is reasonable, night range is enough, but comparing their daytime visibility with other existing models, looks that it's possible and convenient to improve it by extending the body of the buoy.

Having identified the problem we also looked for a reasonable cost solution. Studying the gallows, it is concluded that the material to be added must be strong but light weight. We evaluate existing materials in the local market, we decided on the polyethylene. Despite the virtues of this material, durable and relatively light, the main problem is that if it does not as constituted some kind of protector against ultraviolet rays is not very suitable for use in environments exposed to sunlight, such as, why insist with the local supplier that his location would be outside and so they had to supply it adequately protected against fading or at least delay it as much as possible. Another important decision was the choice of the color most suitable to our latitude ambient light, finally opting the factor RAL 3020 for green and the red for 6024.

Once you have the material properly prepared with the indicated characteristics , we conducted in our workshop corresponding measurements of size and shape, tapered to buoy starboard and rectangular to the port , we ask the own local supplier deliver us the plates cut to size. With the help of fellow of mechanical workshop, we drill in the points already planned and elaborate anchoring elements and corresponding bolts and nuts, all stainless steel. Finally, We just had to pick a day with good weather conditions to carry out the assembly in place. The result was a marked improvement in the daytime visibility of those buoys which we complement with these plates. This shows that as we said in the summary, a small performance and low economic cost if properly planned can be very useful in the continuous process of improving the quality of our maritime signals.

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BEST PRACTICES SESSION

Title	IVEF implementation in Polish National Maritime Safety System
Author	Artur Baranowski
Co-author	Jan Młotkowski; Michał Burka
Experience objective	Interconnection between VTS's in Poland (Gulf of Gdańsk VTS, Szczecin-Świnoujście VTMS, Słupska Bank VTS) and MarSSIES as a National Maritime Safety System master application.
Problem to be addressed	various manufacturer maritime related application interfacing; interoperability between existing master application and new systems
Equipments or services involved	VTS, VTMS, MarSSIES (Maritime Safety and Security Information Exchange System)
Actions	design and test implementation of the IVEF 0.8.3 to establish communication between MarSSIES (Sprint S.A.) and VTS (Indra Sistemas S.A.)
Results achieved	positive test results, proper interconnection established between VTS and MarSSIES
Acquired knowledge	practice in IVEF implementation and IVEF SDK use
Resources saved (if apply)	

Maritime Office in Gdynia, Poland in cooperation with other maritime administrations and services is leading a project “National System of Maritime Safety” (Polish acronym: KSBM) which covers a wide range of undertakings to modernize and update systems being applied by the Polish Maritime Administration to ensure safety at sea and protection of the environment. The system, which complies with relevant national and international legislation, will be used for permanent monitoring of important marine area as well as for navigation surveillance and supporting decision making process in case of a sea accident or environmental disaster. The KSBM will enhance administrative jurisdiction in entire Polish sea areas as well as reaction effectiveness in case of necessity. Main undertakings within the KSBM project include:

- Modernization of existing and setting up new Vessel
  Traffic Services systems for high traffic and navigationally sensitive sea areas along the Polish coast, especially for the Gulf of Gdańsk, TSS Słupska Bank, and the waterway Świnoujście-Szczecin. There will be three VTS systems, all of them equipped with up-to-date coastal radars, sensors, IT hardware communication systems, and software;

- Establishing communication and data exchange platform Maritime Safety and Security Information Exchange System (MarSSIES, www.vizan.pl) which gathers safety related information from the above systems and presents it on common platform. Information available in MarSSIES includes: AIS and radar pictures, vessel tracks, static data, hydro-meteo data, aids to navigation (AtoN) status, weather and navigational warnings, notices to mariners, waving prediction, risk evaluation tools and information exchange platform for the support of crisis management (MSI).

This will be assured by planning elements of infrastructure taking into consideration future requests of e-navigation, but particularly the following issues;

- enlarging of AIS coverage, putting into practise standardized protocols of data exchange - NMEA and **a newly IALA introduced standard IVEF** (Inter VTS Exchange Format); meteorological and hydrological data from port sensors, including AIS binary messages,
- unification of data collection systems to serve for traffic control and surveillance centres (VTS, VTMS), creation of common data bases and standardised data exchange,
- development of maritime information exchange platform MarSSIES (Maritime Safety and Security Information Exchange System) using wide band communication for web service to improve situation awareness, adding METOC and MSI information.

Data exchanged using IVEF message are divided into groups (message types) for example: *ObjectData - DATA* regarding an object in the suppliers domain, contains at least 1 one of the sub elements (TrackData, VesselData, VoyageData):

- *TrackData - DATA* describing a position report of an object, which contains Pos (position) and NavStatus (Navigation status);
- *VesselData - DATA* regarding static elements of an object, like class, id, is black listed?, weight, lenght and many more, which are essential for VTS centers;
- *VoyageData - DATA* regarding a movement of a vessel servers domain, which contains, inter alia, ETA, ETD, ATA, ATD, ISPSLevel, position(from 0 to infinite) and many others;
- *Waypoint* - Waypoint belonging to the route of this voyage.

Server application is written in PHP. Server initiates an asynchronous, persistent connection with other IVEF server using sockets in PHP.

The KSBM project entered into the technical implementation phase in 2010-2014. It is a practical realization of needs and plans related to the implementation of e-Navigation in practice, for better management of safety of navigation.

The achieved results of the IVEF implementation makes possible not only to communicate between any VTS/VTMS and MarSSIES, but also to send/receive traffic related information to/from any similar external system. The data exchange is independent from the software manufacturer, the only requirement is ability of the system to support IVEF.

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BEST PRACTICES SESSION

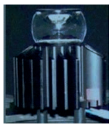
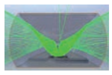
Title	**UTILISATION DE SOURCES LUMINEUSES À LED DANS LES OPTIQUES TRADITIONNELLES**
Author	Yves-Marie Blanchard
Co-author	
Experience objective	Remplacer les lampes à filament utilisées dans les optiques de Fresnel traditionnelles par des sources à LED
Problem to be addressed	Développer, industrialiser et déployer un produit innovant qui répond à un besoin identifié
Equipments or services involved	Sources lumineuses / lentilles en verre traditionnelles Conservation Economie
Actions	L'emploi de LED en matière de source lumineuse est une des évolutions remarquable de ces dernières années. Celles-ci ont pour avantage une meilleure fiabilité, une durée de vie plus longue et une moindre consommation que les lampes traditionnelles à filament, halogène ou à décharge. Les industriels du secteur de la signalisation maritime proposent des fanaux intégrés (source lumineuse + lentille) basé sur cette technologie. La France est un pays avec une tradition ancienne en matière de phare et de balises. Ainsi, beaucoup d'Établissement de Signalisation Maritime portent encore d'importantes lentilles de Fresnel à performances inégalées pour concentrer le flux lumineux. Il n'existe pas de solution industrielle de source lumineuse à DEL pouvant être intégré dans ces lentilles. L’administration française en charge de la gestion des aides à la navigation a cherché à développer de tels produits répondant à son besoin.

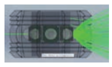
Actions

Sources lumineuses à DEL développées par le CEREMA (ex-CETMEF) :

Programme	Seuils de réglages	Flux lumineux	Développement/ Industrialisation
Monodel Bidel	Monodel	50 lm	Interne CETMEF
	Bidel	100 lm	
Source longue portée V1	Réglage 1	100 lm	Marché industriel (EVOSENS)
	Réglage 2	250 lm	
	Réglage 3	550 lm	
	Réglage 4	1 200 lm	
Source longue portée V2	Réglage 1	2 500 lm	Marché industriel (EVOSENS)
	Réglage 2	5 000 lm	
	Réglage 3	10 000 lm	





- Source CETMEF BiDEL 2006 pouvant remplacer les lampes HLD jusqu'à 20 W. Près de 600 sources sont actuellement déployées sur le littoral.
- Source à DEL V1 prévue pour remplacer les lampes HLD jusqu'à 90 W. Tests sur prototypes validés. Il est prévu un déploiement de près de 1000 sources sur le littoral en 2014.
- Source à DEL V2 prévue pour remplacer les lampes HLD jusqu'à 90 W et 650 W halogène. Tests sur prototypes validés. Il est prévu un déploiement de près de 150 sources sur le littoral en 2014.

Results achieved

- La conservation du patrimoine,
- Une meilleure efficacité,
- Plus de fiabilité,
- Une durée de vie plus longue - près de 10 ans au lieu de 6 mois pour les solutions traditionnelles,
- Une moindre consommation - division par 3 par rapport aux sources halogènes,
- Une solution économique,
- Un meilleur service rendu à l'usager.

Acquired knowledge

Une bonne connaissance des LED, de leur performances et leur utilisation comme source lumineuse

Resources saved (if apply)

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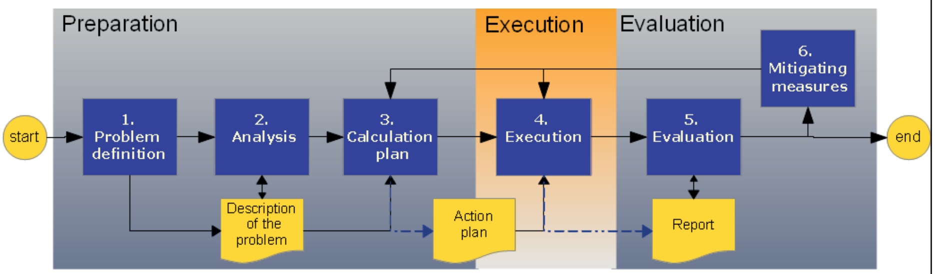
BEST PRACTICES SESSION

Title	**Handbook for Nautical Studies**
Author	Ernst Bolt
Co-author	Remko Smit
Experience objective	To develop a model or methodology to assess ship traffic safety and efficiency.
Problem to be addressed	Policy makers and nautical authorities have to make decisions about the permitted uses of fairways and intended infrastructural changes that may affect shipping safety or efficiency. Society is increasingly articulate and critical in voicing its assessment of the government's investment decisions. The same goes for the response to (policy) issues regarding the efficiency and safety of shipping traffic, and associated investments in wet infrastructure and the organization of traffic management for marine navigation and inland shipping. Prompted by the need for accountability on these kinds of decisions, fact-based substantiation of decisions has to meet ever higher demands.
Equipments or services involved	This handbook is primarily intended for experts researching issues relating to shipping efficiency and safety on behalf of a nautical authority. The nautical authority will then be the client. Whereas the IMO's Formal Safety Assessment [MSC/Circ.1023, IMO 2002] as well as the IALA Guideline 1018 on Risk Management [rev. May 2013] provide useful information on risk management, many nautical authorities displayed the need for a practical 'hands on' approach and guidance in what may be expected from available tools and models.

Model: SAMSON							
effects of	on frequency of ship-ship accidents	on frequency of ship-infra accidents	on frequency of solitary incidents	on the consequences of an accident	on travel times	on reliability of travel times	on environmental impacts
	53%	50%	34%	14%	0%	0%	13%
• infrastructure, characterized by:	0.75	0.75	0.375	0.5	0	0	0.25
o waterway cross section	1	1	0	0	0	0	0
o layout of fairways	1	1	1	1	0	0	1
o objects in the fairway	0	1	0	1	0	0	0
o location of berths and achorage areas	1	0	0.5	0	0	0	0
• the traffic distribution	0.75	0.75	0.75	0	0	0	0
o origin	1	1	1	0	0	0	0
o destination or sailing plans	1	1	1	0	0	0	0
o traffic intensity	1	1	1	0	0	0	0
o traffic arrival patterns	0	0	0	0	0	0	0
• ship's characteristics	0.4	0.4	0.4	0.2	0	0	0.4

Actions

The method starts with defining six phases involved in solving a problem, as depicted in the figure. Each of those six phases is again broken down into a number of consecutive steps. Although the phases and steps appear logical and not very revolutionary, by considering each step of the process it can be avoided that a specific solution or approach is jumped to in an early stage – because it is well known or accessible rather then the right choice for the problem at hand. The handbook describes primarily *what* steps have to be taken, but also some guidance and support is provided *how* to perform those steps.



In the *Preparation* phase it has to be made clear what the intended changes comprise, how they are motivated and what kind of results the sponsor expects to get from the study. As indicated in the figure, the Preparation phase may be split up into three steps. Between those steps it is essential to synchronise the views of sponsor and specialist. The result of this phase is a *Calculation plan*, which specifies the way the problem will be solved, including the model and/or tools that will be used and the source of the necessary input data.

Results achieved

By using the Handbook, the problem solving process is standardized and transparent.
The process steps are supported by information provided in the annexes. These include:

- An extensive list of terms used in risk analysis, including referenced source;
- A template for the problem description;
- Description and classification of available models and tools, with an analysis of the area of application and the relationships between input and output parameters covered;
- Checklist for possible secondary effects;
- Suggested mitigating measures.

Acquired knowledge	The intention is of the Handbook to grow it into a collection of best practices, including instructions on how to use them. It is therefore a perpetual work in progress that will continuously be improved and added to based on the experiences of its users. Users are therefore expressly asked to submit any suggestions to the document manager.
Resources saved (if apply)	Avoiding research which would lead to a useless answer may yield major savings. Moreover, the Handbook assists in a clear and efficient break-down of the questions to be solved, the selection of capable tools and possibly adjusting expected answers.

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Title	"HOW TO REDUCE BAD HABITS IN VTS OPERATORS"
Author	Carlos Fernández Salinas VTS Head of Area Centro Jovellanos. IALA Expert (2013-2018)
Experience objective	Reduce bad habits in VTS operators.
Problem to be addressed	In general, we can state that during the course of their activities VTS operators can make three different types of operational inaccuracies**:** ✓ Errors. ✓ Failures. ✓ Bad habits. When a VTS operator ignores how to solve a particular problem, for example, because he/she lacks the theoretical notions necessary for that purpose, he/she makes "errors". A typical error is the misconception. At a comparative level, machines and programmes make errors. A machine has not been designed to operate within certain parameters, so the error is repeated whenever these parameters are reached. A "failure" occurs when the VTS operator knows the theory to deal with a specific situation, but lacks the necessary ability to put it into practice, for instance, in case he/she has little experience in handling some specific VTS equipment. Finally, a VTS operator falls for a "bad habit" when, despite knowing the theory and having the necessary ability to deal with a situation as required by the regulations, the operator does not follow the officially established procedures, either because he/she does not consider them appropriate, or because he/she has a preference for another solution, generally faster and simpler. The manager of the VTS service is responsible for reducing the three types of operational inaccuracies to the minimum. Traditionally, errors are corrected with theoretical training, failures with practical training and bad habits with fines or employment penalties. As each inaccuracy has a different origin, the solution must be different in each case. No matter how many times a worker who makes errors is fined. If he/she has never been taught the theory to handle a particular problem, he/she will never be able to solve it. Simulators and the "on the job training" period have proved to be effective to correct "failures" as they provide VTS operators with a "safe" experience to use on their daily practice. Chasing after "bad habits" with continued fines or employment penalties is not the best solution for a VTS manager.

Equipments or services involved	We propose the use of VTS simulators to warn operators how dangerous "bad habits" can be in a VTS scenario and to make them aware of the need to correct "bad habits" by themselves. Some examples of bad habits that can be dealt in a VTS simulator are the following ones: ✓ Not using the Standard Marine Communication Phrases, especially the message markers. ✓ To assume what best fits a VTS operator. ✓ To start VHF exchange with a vessel without first checking the traffic situation in its surroundings. ✓ Gradual loss of situational awareness. ✓ Tendency of the VTS operator who has been a seaman to play the role of the person who is in the bridge of the ship. ✓ Remain silent as a solution to solve a traffic conflict.
Actions	Let's consider the first example. Not using the Standard Marine Communication Phrases can override the preventive effect of a VTS. In this sense, the conclusions of the investigation commission about the "Stena Feronia" and "Union Moon" collision in waters of the port of Belfast are quite relevant. At the Centro Jovellanos we have designed several VTS exercises that serve as a basis to deal with this problem. For instance, a small-sized vessel requests navigational assistance to a VTS operator. Once the exercise has ended, voice recordings are replayed. If the operator has not made use of message markers such as "Information" or "Advice", it gives the impression that the VTS has provided the vessel with specific rudder and engine orders, something totally inadvisable from the operational point of view. When hearing his/her own voice, the VTS operator who normally thinks he/she had done it well during the simulation , gets surprised by the effect of his/her "naked messages", and so he/she recognizes the need to correct his/her communications procedures.
Results achieved	VTS simulators are not only an essential tool to train future operators, but are also quite useful to correct the bad habits of those who have been working for years. In short, designing exercises as close to reality as possible is the key to success.
Acquired knowledge	The need of developing VTS operators' professional skills by means of simulation exercises and discussion of real cases.
Resources saved (if apply)	Thanks to the proper training of the VTS operators in terms of their professional skills, the number of possible accidents is likely to be reduced.

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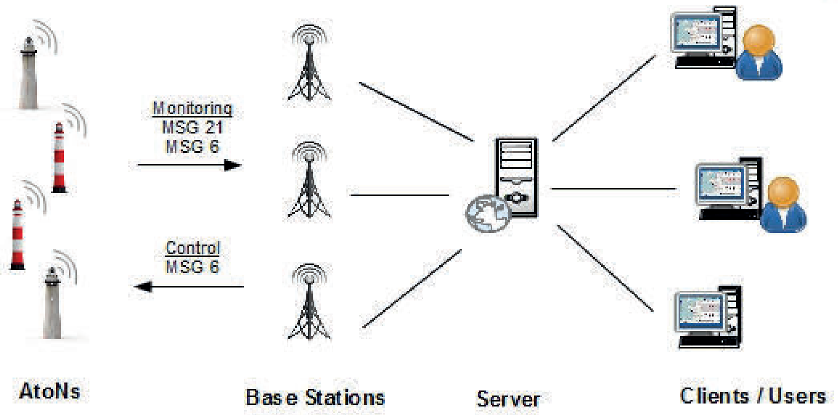
Title	AtoN's remote monitoring and AtoN's remote control with AIS messages with a dedicated low cost coastal Station
Author	Pierre-Yves Martin
Co-author	
Experience objective	
Problem to be addressed	Remote monitoring and remote control of AtoNs using AIS without Base Station to transmit and receive AIS messages.
Equipments or services involved	Remote control and remote monitoring of ATONs
Actions	
Results achieved	
Acquired knowledge	
Resources saved (if apply)	

The AIS Shore Stations have been designed during the definition phase of the STAN (Système de Télésurveillance des Aides à la Navigation), the AtoN's Remote Monitoring System.

STAN is a project led by the the French Lighthouse Authority. It should allow the setting up of a centralised service for the remote monitoring and control of 400 AtoNs. It began in 2011 and its specifications are as follows :

- remote monitoring using the Aids-to-Navigation report (Message 21) and the Aids-to-Navigation monitoring data message (Message 6, DAC =235, FI =10) registered by UK Trinity House
- remote control using the Aids-to-Navigation data message (Message 6, DAC = 235, FI =10) with the implementation of the spare bits
- STAN implementation through a browser (web service architecture)
- mutualisation des infrastructures existantes, especially the AIS Base Stations owned by MRCCs and the French Navy

The block diagram of the STAN is as follows :

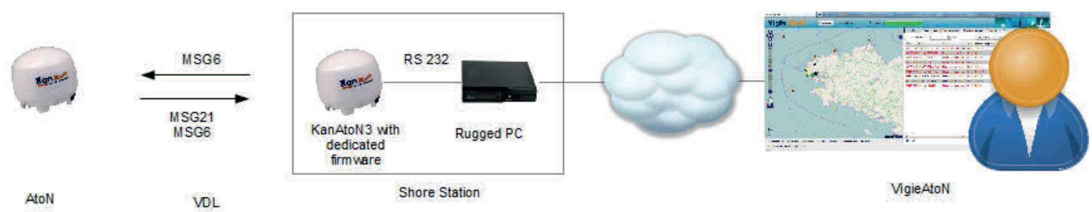


STAN program was carried out thanks a solution provided by McMurdo company. The hardware consists of KanAtoN3 and ComAtoN which are installed onboard the AtoN. The ComAtoN allows the acquisition and the processing of the status parameters and commands. The KanAtoN3 allows the transmission and the reception of the parameters on the VDL. VigieAtoN is the software which is a SCADA dedicated to the processing and to the analysis of messages 21, 6, 8 and 4.

In some situations the routing of AIS messages from from AtoNs to VigieAToN can be hard : for example when there is no base station in the VDL coverage of the AtoNs or when the connection to the base stations is not allowed for reasons of security clearance.

To address these cases it was necessary to make an inexpensive device to relay AIS messages between monitored AtoNs and the shore

The technical solution was designed by McMurdo. It combines a KanAton3 whose the firmware has been modified and a local server for connecting to the Internet



For the remote monitoring, the Shore Station receives and routes to VigieAToN the AIS messages received from AtoNs. For the remote control, the Shore Station transmits the AIS messages routed from VigieAtoN.

The Shore Station is easily installed in any place that is under radio coverage of remotely monitored AtoNs. The only requirement is that a DSL connection is the availability of a DSL connection for network connection with VigieAToN.

This is a low cost solution which usefully allows to replace a Base Station for the remote monitoring and remote control of AtoNs.

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BEST PRACTICES SESSION

Title

Dynamic Chart Overlays
to maximise the safety of navigation and assist in contingency planning

Author

Captain Jonathon Pearce
Business Development Manager, OMC International

Experience objective

To maximise the safety of navigation through a unique chart overlay system on the vessel during transit in real-time

Problem to be addressed

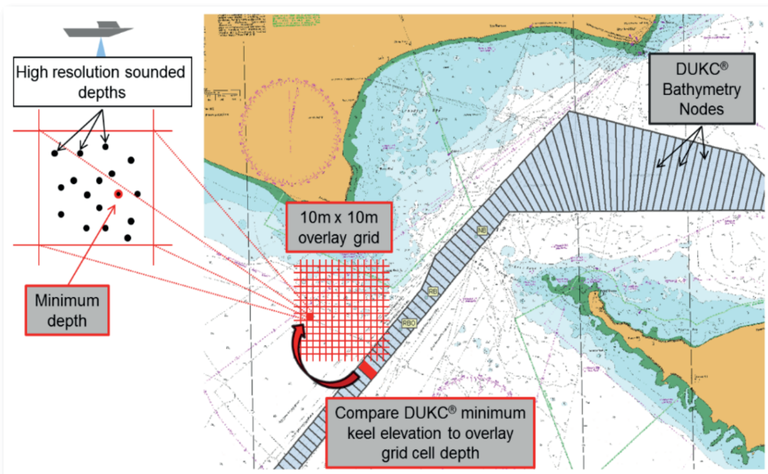
To deliver real-time information to the pilot on a vessel to ensure safety of navigation within a tidal channel and to improve contingency planning in the event of an unforeseen incident.

Equipment or services involved

OMC Dynamic Underkeel Clearance technology delivered to Navicom Dynamic PPU laptops via QPS Qastor Connect server

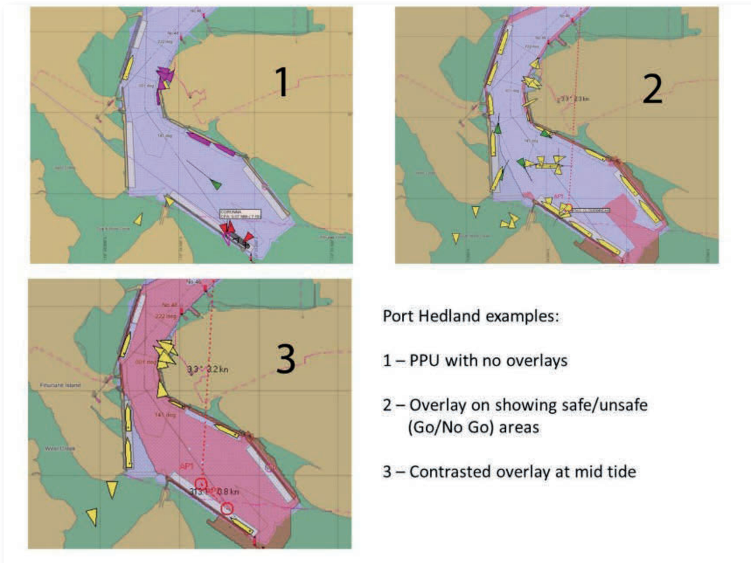
Actions

Creation of a real-time dynamic chart overlay showing the predicted under-keel clearances throughout the passage in a format that is easily understandable, and able to be adjusted, for the pilot.
The overlay to be updated at frequent intervals (1 minute) accounting for environmental changes. Had to allow for account channel changes (regular surveying). Can be used to assist in contingency planning to ensure multiple vessel/s safely transit. The system to allow for maximise water column efficiency through maximum drafts and longer tidal windows and also optimize sailing rotation to increase productivity.
Creation of a communications system to transit the overlays to the pilot through 3G networks, and for the PPU laptop to be able to display the overlays without excessive overheads or negative impact on the primary navigation software. Integrated and continuous mutual sharing/adaptation of transit plan between pilot and VTS/Port Control/HM.



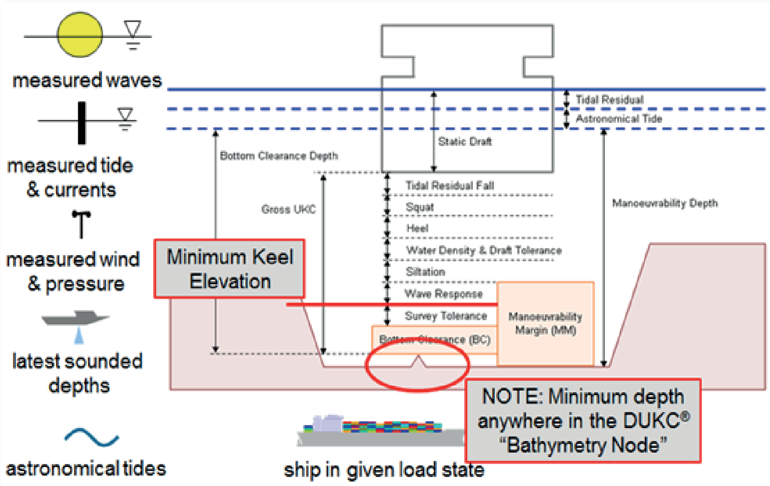
Results achieved

System installed and operational at Port Hedland 2013.
Improved productivity/throughput of vessels/cargo through the optimization of vessels sailing on a tide.
VTS/Port Control/HM and Pilots able to see the predicted UKC for the whole transit (30 nautical miles) and plan/optimize the sailing plan.
Overlays made available to the pilot's PPU laptop, and updated continuously, and the transit can be altered if required by pilot or shore.
Enhanced contingency planning as the pilot can assess exactly how much time/ vessel speed profile is required before the conditions become critical and can effect contingency measures to avoid a vessel grounding.



Acquired knowledge

Dynamic Under-keel Clearance system updated to V5 with sophisticated environmental monitoring systems.
Qastor QPS Connect server systems and the transmission of mission critical chart overlays to remote PPU laptops.
Navicom Dynamic and the pilots' involvement of ensuring overlays were acceptable and did not impact on the navigation system and were easily adjusted when required. Improved understanding of the port channels, its limitations and control points.



Resources saved (if apply)

Significant savings in capital dredging costs through the optimisation of the existing tidal water column. Maintenance dredging optimised to ensure channel remains at sufficient depth to ensure maximum productivity.

Associated Paper

ENHANCED SAFETY THROUGH THE USE OF REAL-TIME DYNAMIC CHARTS OVERLAYS

Captain Jonathon Pearce, Senior Pilotage Advisor, OMC International

18th. IALA CONFERENCE
A CORUÑA – SPAIN
25-31 May 2014

BEST PRACTICES SESSION

Title	Handling of echoes using VoIP technology in case of multiple shore receptions of maritime communications.
Author	Romain GALLEN
Co-authors	François Bajard-Jacobs, Patrick Doaré, Thierry Le Poder
Experience objective	The goal is to connect all VHF and MHF shore stations on a MPLS network and to use Voice on IP to transport maritime communications to the different MRCCs in France.
Problem to be addressed	Reduce the echo perceived by operators in MRCCs when receiving a radio communicaton because the delay of transportation of the call received from the different shore stations varies. Suppress the voice feedback when a message is emitted from one shore station of the MRCC and is subsequently received by neighbouring shore stations.
Equipments or services involved	Equipments: VHF and MHF radio equipments, routeurs and VoIP gateways, central processing system Services: Technical services in CEREMA, in MRCCs, VTS and in telecommunication companies
Actions	• Transfer all existing classical voice transportation links to MPLS network. • Elaborate the complete routing scheme of shore radio stations linked to a given MRCC. • Distribute IP adresses to all the elements interconnected in this network. • Use RTCP protocol in order to gather statistics for connections (transmitted octet and packet counts, lost packet counts, jitter, and round-trip delay time). • Use this information to control and adjust quality of service (by limiting the flow or using a different codec). • Estimate in real time the latencies in the different parts of the network in order to align the voice communications on a same reference and limit troublesome echo effects.

Results achieved	By connecting all routing and radio communication systems, the supervision of the working state of these elements and of the transportation links is greatly improved. It is possible to gather all these information in a unique supervisor console for operators and technical services to be aware in real time of their capabilities to send or receive maritime radio communications. By using the statistics extracted from RTCP frames used in VoIP technology, it is possible to nullify the echo generated when a message is received by multiple radio shore stations. It is also possible to suppress the echo generated when a message is emitted on simplex channels by a MRCC using a given coastal radio station and that neighbouring stations receive this same message and carry it back to the MRCC.
Acquired knowledge	We acquired knowledge on VoIP standards, technologies and communication protocols. We also learned the fine tuning parameters that needed to be requested from telecommunications services companies when ordering links dedicated to the transportation of maritime communications. We learned how to extract and to use all statistics hidden in the different protocols of the world of VoIP and we adapted them to the specific issues linked to multiple receptions of a given message from different radio stations. We learned how to discriminate failures from the voice transportation link from equipment failures and how to picture them to the operators. We learned how we could adapt quality of voice transportation in degraded situations.
Resources saved (if apply)	Depending on the telecommunication operator, the renting of SDSL links with QoS for voice transportation can be very low as compared with old technologies such as RNIS, Transfix, LS. The renting of these links can be divided by 3 in the best cases. Of course, in other cases an investment may be necessary to finance the initial cost for the telecommunication operator to link distant sites to its network.

18th. IALA CONFERENCE
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BEST PRACTICES SESSION

Title	The use of AIS in a mixed area
Author	Jeffrey van Gils
Co-author	
Experience objective	Setting up an Automatic Identification System (AIS) environment within an area under responsibility of various competent authorities with diverging responsibilities
Problem to be addressed	The Netherlands is a small country with many waterway authorities and it is neighbouring with countries having their own interests, administrative systems of responsibilities and tasks. The shipping density in these waters (coastal waters, harbour approaches, port areas and inland waterways) is very high and shows a combination of sea-going and inland vessels. The use of AIS therefore already at present is meeting a number of problems to be solved. One of these is the fact that the Netherlands has a rather flat surface which has impact on the potential use of AIS due to propagation and interference reasons. It is therefore of most importance that in order to ensure an optimal operation of AIS services by so many users, both ship-borne and ashore a coherent national policy framework will be developed and implemented on short term. In the future the VHF Data Exchange System (VDES) may resolve some off the problems, enforced by the ITU decision (WRC 2012) to add extra frequency capacity to the VHF band. In order to secure the optimum benefits of this decision and to prevent that the primary functionalities of AIS will be jeopardised, the VHF Data Link (VDL) of AIS must be protected. On an average day approximately 6000 AIS targets in the Netherlands are detected of which 1500 are sailing through or passing the Netherlands. Every target is transmitting the standard AIS messages. An increasing number of AIS users, both ashore and ship borne, have identified - due to the capabilities of the AIS

	system – more potential applications in using AIS and even started to develop or use them already, mainly under the flag of *e-Navigation* or the European Inland Waters project *River Information Services (RIS)*. As a result the transmission of a large variety of data using AIS is growing quite rapidly. In most cases this data is contained into so-called Application Specific Messages (ASM), although sometimes even safety messages are used for this purpose. The further development of future applications, the implementation and operational use of AIS requires a coordinated central approach and a (legislative or policy) framework. Close collaboration with users, authorities (including those responsible for frequency management) is considered to be essential for the assignment of the provision of ASM and AIS-slots.
Equipments or services involved	• Automatic Identification System (AIS) shore-based networks • VTS-systems • On-board ship equipment.
Actions	• Making national and international parties aware of the shared challenges and seek collaboration in order to come to common accepted solutions for the establishment of a transnational good operational AIS system. • Therefore one has to start on national level and extend the process at the proper moment with the neighbouring countries. • The process and all substantial results, such as agreements, assignments, criteria and conditions for operational use should be incorporated into a common accepted policy document.
Results achieved	In the past years the knowledge of AIS and possible problems became more clear to waterway authorities and other users, and this was emphasized by the publications of relevant IMO and IALA documents. During the introduction of AIS for inland shipping (in short time an increase of approximately 12.000 mobile stations) and the realization of the shore based networks it was noticed that especially the shore based networks encountered problems such as "jumping ships" (icon jumps) and a decrease of the coverage area. In order to resolve these problems and to restore a further reliable coverage of the areas of responsibility and interest

	huge investments would be needed. The Netherlands Ministry of Infrastructure and the Environment, responsible for the implementation and operation of the AIS, initiated the development of a policy on the use and operational exploitation of the networks, including the appointment of a central point of contact for advice and guidance. During this process all relevant stakeholders were involved. IMO and ITU have developed a number of Application Specific Messages with the aim for global standardization, uniform in every country. This action resulted in the avoidance of creating new ASM (with almost the same information) and as such prevented an unnecessary overload of the VHF Datalink (VDL). In parallel IALA has produced a Recommendation on the delivery of ASM and also realised a collection of globally used ASM, which is accessible via the worldwide web. Waterway authorities and service providers, as well as any other party licenced by the appropriate administrative body (may differ from country to country) with the possibility to register their ASMs in this collection. This offers other countries the re-use of these ASM's. An extra benefit of this approach is the minimization of investments in shore based and ship borne systems.
Acquired knowledge	Understanding AIS, expertise on radio propagation, management of frequency use and the development and use of ASM.
Resources saved (if apply)	Optimal use of, scarce frequency spectrum, investments in infrastructure (shore) and equipment (ship), re-use of similar information without extra efforts, standardization leading to reduction of development investments.

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BEST PRACTICES SESSION

Title	**REPARATION D'UNE TOURELLE EN MER A L'AIDE DE BETON FIBRE ULTRA PERFORMANT (BFUP)**
Author	Nicolas FADY
Co-author	Emmanuel DENARIE
Experience objective	Essai de mise en oeuvre de BFUP coulé en place sur une tourelle en mer dans le but d'arrêter la dégradation du béton et de renforcer la structure
Problem to be addressed	Dans le cadre d'études de nouvelles méthodes de réparation du génie civil des ouvrages de Signalisation Maritime, le Cerema a travaillé avec le Service des Phares & Balises de Lorient et l'Ecole Polytechnique Fédérale de Lausanne (EPFL, Suisse) sur les Bétons Fibrés Ultra-Performants (BFUP). En effet l'utilisation des BFUP appliquée avec succès sur des ponts par l'EPFL depuis 1999 répond à trois contraintes identiques à celles rencontrées pour les ouvrages en mer : - la recherche d'une étanchéité parfaite et durable - la réduction du temps d'intervention par la mise en oeuvre de faibles épaisseurs - au besoin, la possibilité de renforcer l'ouvrage Un essai pilote de BFUP coulé en place par hélicoptère a ainsi été réalisé en juin 2013 sur une tourelle en mer.
Equipments or services involved	La tourelle du Cabon se situe au sud de la rade de Lorient. Il s'agit d'une maçonnerie de béton grossier, âgée de 70 ans environ, tronconique, haute de 4.55 m et de 3.25 m de diamètre à la base. Les fissurations constatées sur la maçonnerie semblant être la conséquence d'une réaction de gonflement, des carottages ont été réalisés afin d'être analysés au microscope électronique à balayage. Les résultats de ces analyses n'ont pas clairement révélé de pathologies très actives de gonflement telles que l'alcali-réaction ou les réactions sulfatiques.

Actions	La mise en place d'une coque continue de 60 mm d'épaisseur de BFUP écrouissant en traction, coulée en place et recouvrant entièrement la tourelle, a alors été préconisé. Cette solution présentait le triple avantage : - d'assurer une étanchéité totale vis-à-vis de la pénétration de l'eau de mer,par conséquent des chlorures et des sulfates, - de ceinturer la tourelle d'un matériau durable et résistant, - de fournir une capacité de déformation de l'ordre de 2/1000 en traction, permettant de compenser d'éventuels gonflements résiduels, sans présenter de fissuration localisée. Un partenariat a alors été établi avec l'entreprise Lafarge pour développer une formulation de BFUP adaptée au coulage en place Des essais à terre ont été organisés pour : - obtenir une recette de BFUP avec un étalement compris entre 660 et 750 mm sur 2h et un écrouissage en traction de 2/1000, - tester la mise en place de BFUP dans un coffrage cylindrique La formulation de BFUP retenue a un rapport Eau/Ciment entre 0.21 et 0.23 et un dosage de 3.25 % en volume de fibres d'acier droites. Elle présente à l'état frais une consistance de classe SF 2 comparable à un béton autoplaçant. Sa résistance à la traction uniaxiale à 28 jours est supérieure à 10 Mpa. La coque de 60 mm de BFUP a été coulée grâce à un coffrage métallique tronconique de 2 mm d'épaisseur, 4,60 m de hauteur, d'un diamètre de 3,37 m à la base et de 2,48 m en haut. Un montage à blanc en atelier a été réalisé. Les deux difficultés majeures étaient d'assurer une étanchéité parfaite (fluidité du BFUP) et de résister à la poussée hydrostatique du BFUP frais. Un radier a donc été réalisé au pied de la tourelle, pour offrir une surface plane afin de positionner parfaitement le coffrage. Sa mise en place autour de la tourelle, en deux parties pré-assemblées, s'est effectuée par hélitreuillage. Les 2 rotations nécessaires n'ont duré que 18 mn alors qu'il aurait fallu plus d'une journée pour assembler le coffrage sur place. 5 m^3 de BFUP ont été nécessaires, acheminés par camion-toupie à proximité de la tourelle où les attendaient l'hélicoptère. Le BFUP a été transporté jusqu'à la tourelle par bennes de 300 litres, soit 780 kg environ. Seize rotations d'hélicoptère auront été nécessaires soit à peine deux heures. Après décoffrage, d'une manière assez inexplicable, seules 3 zones d'une surface très limitée – quelques dizaines de cm² – ont présenté des manques de matériau. Elles ont été ragréées à l'aide d'un mortier fibré. Le BFUP s'est par ailleurs bien réparti tout autour de la tourelle. Le rendu de surface du BFUP est globalement de très bonne qualité et uniforme.

Results achieved	Cette expérience positive constitue une première mondiale au titre de BFUP coulé en place sur un ouvrage de génie civil en mer et ouvre la perspective d'autres utilisations sur des ouvrages maritimes plus importants. Elle permet de valider la faisabilité technique de cette méthode. Dans la continuité de ce chantier et suite aux tempêtes de début 2014, l'EPFL et le CEREMA travaillent activement à l'élaboration d'un projet de renforcement du phare de la Jument, situé en Bretagne, faisant également appel au BFUP. En effet c'est bien dans ce contexte d'environnement très agressif et de temps d'intervention très limités que les BFUP montrent tout leur intérêt.
Acquired knowledge	- les contraines de mise en oeuvre du BFUP - l'organisation d'un chantier en mer à l'aide d'un hélicoptère

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