IENC: NEW PURPOSE OR NEW APPROACH?

Author: Gert Morlion

De Vlaamse Waterweg
IENCs: new approach or new purpose?

1. Current purpose
2. New opportunities
3. Influence of smart shipping on the approach
4. Conclusion
European RIS-directive 2005:
• obligation to produce and distribute digital navigation charts
• for waterways CEMT class IVa and higher
• with minimum content required
Implementing regulation:

“The purpose of using the electronic chart display and information system for inland navigation (Inland ECDIS) is to contribute to the safety and efficiency of inland navigation. For that reason, the technical specifications defined in Commission Implementing Regulation (EU) No 909/2013 (2) for the Inland ECDIS device and the Inland Electronic Navigational Chart (Inland ENC) should be further revised and clarified.”
De Vlaamse Waterweg:
- safety reasons
- encoded all navigable waterways
- usage 7
- big effort
- no procedures, no automatic processes
2 New opportunities

Autonomous navigation – smart shipping:

• Flanders = *one big test area*

• *Several* pilots ongoing:
  • new technologies
  • new research
  • *different* approaches
Pilot “Autonoom varen in de Westhoek”

**Navigation algorithms uses IENC as base!**

- S-57 datamodel
- Only features and attributes related to the safety of navigation
2 New opportunities

Requirements:

• Availability of the navigation chart
• Quality of the data in the chart:
  • Completeness
  • Correctness
  • Punctuality
  • Accuracy
2 New opportunities

What defines ‘quality’?

• Correctness:
  • is the info correct?
  • are attributes correct?

• Completeness:
  • Are all features, attributes in the chart?

• Punctuality:
  • Is the information ‘fresh’ enough?

• Accuracy:
  • Is the geographical data accurate enough for its purpose?
  • ...

De Vlaamse Waterweg™
Quality information in IENC:

- Correctness, completeness:
  - Important but difficult to collect, measure and qualify

- Punctuality:
  - Can be qualified by e.g. date

- Accuracy:
  - Accuracies per area or feature
  - Horizontal, vertical accuracies
  - Temporal variation (likely to change, unlikely to change, unassessed)
Influence of smart shipping on the approach

Current situation (edition 2.4):

• No quality information in IENCs
• Therefore calculations/algorithms have to take a big uncertainty into account
• Reliability decreases
How to get this information in the charts?

Changing the standard:
- Adding new feature (M_ACCY) with attributes
- Adding attributes to existing features

Change requests were finished and can be adopted by the IEHG in October 2019
IENCs as base for navigating autonomous:
- Approach and use change
- Requirements regarding quality increases

Result:
- Accuracy requirements needs to be defined
- Surveys needs to be executed with these required accuracies
BUT

The initial purpose for the production of electronic navigational chart remains the same.

*Safety and efficiency of the inland navigation*
A SPATIAL DATABASE AS THE BACKBONE OF RIS – HOW TO BRING SPATIAL AWARENESS TO FLAT-FILE NAUTICAL DATA

Author: Jonathan Gallagher
viadonau
Data

Background
RIS COMEX is the latest of several large-scale projects dealing with the harmonization of RIS across Europe.

- 13 involved countries
- Roughly 60 services
  - Where are the relevant objects located?
  - How are they connected to each other?
  - When and to which extent are they available?

The implementation of COMEX services requires a new Reference Data Model.

→ what do we need and what do we have?
RIS Index

Object Reference Data Repository
A single table were
• each row represents an object
• each column is an attribute, e.g.
  • Unique Object ID
  • Object Name
  • Object Class
  • Latitude
  • Longitude
  • and many more
Flat File Database

- All object mixed in a **single table**
- Respective **attributes appended** to table
- **Uniform format** of all objects
- Objects **share attributes** of all other objects

<table>
<thead>
<tr>
<th>RIS Index</th>
<th>Object ID</th>
<th>Object Name</th>
<th>Object Class</th>
<th>No. of Openings</th>
<th>Clearance Height</th>
<th>Maximum Width</th>
<th>Geodetic Reference</th>
<th>Area of Applicability</th>
<th>Many more</th>
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</table>

→ Inability to encode relations efficiently
Relations

Attributive Relations
Established between two or more tables with a key. Primary and foreign key are stored in the objects attributes

Spatial Relations
Relations

Attributive Relations
Established between two or more tables with a key. Primary and foreign key are stored in the objects attributes

Spatial Relations
Derived from the objects location on the surface of the earth. Based on topology, direction or distance
Relational Database

- Objects subdivided into several tables each representing a different object class
- Each table consists of attributes of specific object class only
- Additional table called Index used to quickly locate objects
- The Index consists of the primary keys of every object
Relational Database

- Objects subdivided into several tables each representing a different object class
- Each table consists of attributes of specific object class only
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<thead>
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<th>Bridge Opening</th>
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Spatial Database

- Additional spatial index
- Querying and manipulation based on location
- Each object with associated shape

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<td>Reference Gauge ID</td>
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- A network can be constructed with multidimensional shapes as a geometric model of the real world
Spatial Database

- Additional **spatial index**
- Querying and manipulation based on **location**
- Each object with associated **shape**

A network can be constructed with multidimensional shapes as a geometric model of the real world
COMEX Reference Network Model

Network

RIS Index
COMEX Reference Network Model

Network

RIS Index

Shape

Separate Tables

Spatial Database
COMEX Services

Voyage Planner

Vessel Dimensions

Fairway Dimensions

Depth Data from Gauges

Object Limitations

Dynamic Limitations from NtS

Shortest Path
COMEX Services

Voyage Planner

Vessel Dimensions

Fairway Dimensions

Object Limitations

Depth Data from Gauges

Dynamic Limitations from NtS

Route & ETA

AIS

Shortest Path
THANK YOU FOR YOUR ATTENTION!

Contact

Jonathan Gallagher
T +43 50 4321-1632
jonathan.gallagher@viadonau.org
Donau-City-Straße 1, 1220 Vienna
UPPER RHINE
RIVER INFORMATION SERVICES : E-RIS

Authors: Raphaël WISSELMANN – VNF
Michel BACH – VNF
Lucas HUSSON - EDF
A large-scale project

Context of the Action: The Rhine

THE RHINE
- **An important annual volume on the canalized sector of the Rhine**
  27 000 vessels going through the locks, 200 000 passengers carried, 25 million tons of goods
- **An important geopolitical and regulatory context**
  Management of the Upper Rhine (VNF, EDF, WSV, Swiss companies), a milestone contribution to the CCNR & EU RIS policy, construction of a sustainable partnership between EDF and VNF

THE PROJECT
- **3 major goals for the Upper Rhine**
  Improve the information on the Upper Rhine navigation, enhance the competitiveness of the Rhine navigation, propose new added value services and stimulate smart steaming
- **A visible and long-awaited project in Europe**
  A project financed by VNF, EDF and the EU in the framework of Riscomex, a contribution to the Corridor Management project (RIS CoMex), high expectations from the countries bordering the Rhine
A partnership between EDF and VNF

EDF
- French electricity producer and provider
- Operation and maintenance of 8 locks on the Rhine

VNF
- Police authority on the Rhine
- French RIS operator
- Manager of French waterways network (6700 km)
Project history – www.e-ris.eu

A bottom-up approach

STUDY
- Build the target vision (more than 60 key user interviews)
- Define the roadmap
- Specify the 1st step

2013-2014

BUILD
- Trial functional components
- Realize a proof-of-concept web portal for RIS Upper Rhine

2015

DISPLAY
- Display the web portal RIS Upper Rhine

2016

Total budget: € 3 million

RUN
- Produce and provide new versions
- Develop e-RIS Mobile
- Co-manage the solution

Since 2017
A modern and innovative tool with multiple functionalities – Public information
A modern and innovative tool with multiple functionalities – Public information
A modern and innovative tool with multiple functionalities – Public information
A modern and innovative tool with multiple functionalities – Information only accessible after registration
A modern and innovative tool with multiple functionalities – Information only accessible after registration.
Architecture
www.e-ris.eu
1 – Ship asks for a time slot at a port
2 – Proposal for a loading and unloading time slot
3 – Exchange of voyage information and duration of the stop
4 – ETA calculation based on speed, traffic density, availability of locks
5 – Provision of ETA
6 – Adjustment of the schedule, if necessary
Conclusion and outlook

e-RIS, a success story: Over 1600 downloads of the mobile app so far and still increasing. Most users come from the Netherlands, but we also have users from Belgium, Germany, Luxembourg, Switzerland and France.

Implementation on the River Seine ([www.sif-seine.fr](http://www.sif-seine.fr))

Development of e-RIS with new versions and new services
Thank you for your attention!

www.e-ris.eu

Contacts:
Raphaël WISSELMANN – VNF raphael.wisselmann@vnf.fr
Michel BACH – VNF michel.bach@vnf.fr
& Lucas HUSSON – EDF lucas.husson@edf.fr
MASTERPLAN DIGITALIZATION OF INLAND WATERWAYS

Author: Therry van der Burgt, Martijn van Hengstum
Rijkswaterstaat
Masterplan Digitalization of Inland Waterways (DIWA)
Contents

- Introduction
- Objectives
- Structure
- Activities
Digital INland waterway Area

Commissioned 2016 by European Union – Directorate General MOVE

Study for investigating potential for digitalization in IWT sector

Conclusion: It is essential for the future competitiveness of inland waterway transport to follow the trends in digitalization
Digitization
The process of making information available and accessible in a digital format.

Digitalization
The process of considering how best to apply digitized information to simplify specific operations.

Digital Transformation
The process of devising new business applications that integrate all the digitized data and digitalized applications.

https://www.coresystems.net/blog/difference-between-digitization-digitalization-and-digital-transformation
Establish a joint and integral digitalization strategy for Inland Waterways under the responsibility of the participating fairway authorities

Establish a roadmap for fairway authorities for the digital transformation of Inland Waterways to support navigation, traffic and transport management and logistics.

Deliver implementation scenarios considering technical, financial, organizational and operational consequences.

Considering:
RIS implementation status (CoRISMa & COMEX)
Masterplan Digitalization of Inland Waterways

Activity 1 Project management
1.1 Project Management
1.2 Quality & Risk management
1.3 Admin coordination
1.4 Technical coordination

Activity 2 Business Developments
2.1 Smart shipping
2.2 Synchro modality
2.3 Port & terminal info service
2.4 RIS enabled corridor management
2.5 ITS, ERTMS, e-navigation

Activity 3 Technological Developments
3.1 New technologies
3.2 IWT connectivity platform
3.3 Smart sensing & PNT
3.4 Information model & data registry
3.5 Tech in other transport domains

Activity 4 Facilitation topics
4.1 Standardization
4.2 Legal & regulatory
4.3 Cybersecurity & privacy
4.4 Data quality

Activity 5 Masterplan
5.1 Vision on digital transition
5.2 Roadmap on digitalization
5.3 Definition of consequences

Activity 6 Stakeholder Engagement
6.1 Stakeholder engagement plan
6.2 Business reference group
6.3 Technical reference group
6.4 Engagement tools
6.5 Dissemination
Participants

FR
BE
NL
NI
DE
AT
<table>
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<th>2019</th>
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<td>Activity 5 Masterplan</td>
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<td>Activity 6 Stakeholder engagement</td>
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</table>
Business developments

- **Smart shipping**: Do smart ships need smart infrastructure?
- **Synchromodality**: Information services across the complete multi-modal transport chain
- **Port & Terminal information service**: Interaction with IWT requires reliable digital interfaces
- **ITS, ERTMS, E-navigation**: Re-use of information services from rail, maritime and road transport domains in IWT
- **RIS enabled corridor management**: Single EU information window on IWT
Technological developments

New technologies
Internet of Things, Big Data, Artificial Intelligence

IWT connectivity platform
Data exchange technology and interconnection in multi-modal transport

Smart sensing & PNT
Sensor technology and Position, Navigation & Timing technology requirements

Information model & data registry
Harmonized information model

Technology in other transport domains
Which technological developments are suitable for use in IWT?
Facilitators

Standardization
Collection, integration, exchange, presentation and analysis of data, information and systems

Cybersecurity & privacy
Measures for prevention, detection and reaction to cyber-attacks on the processes in the transport and logistic chain

Legal & regulatory
Overview of obligations and restrictions but also advise on measures to be taken.

Data quality
Pre-conditions and requirements on data quality management related to IWT services, systems and information.
Masterplan

Vision on digital transition in IWT

IWT Digitalization Maturity Model

Roadmap & scenarios


Stakeholder Engagement

Business Reference Group

Technical Reference Group

We need you!

- Suggestions
- Relevant developments
- Contacts
- Reference group contributions
- Etc.

Are most welcome!
Thank you for your attention!

Therry.vander.burgt@rws.nl
Martijn.van.hengstum@rws.nl
WG125 –
NEW CHALLENGES FOR RIS

Author : Piet Creemers
De Vlaamse Waterweg nv
Overview

• Historical overview WG 125

• Identify challenges for Inland Navigation

• Approach WG 125
Historical overview WG 125
Overview of published reports

GUIDELINES 2002

- Initial release
- Approach based on ideas, visions and concepts
- High level
- Inspiration for R&D

GUIDELINES 2004

- Academic approach
- Introduction of traffic and transport related services
- Inspiration for (pilot) implementations
## Traffic related services

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
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<tbody>
<tr>
<td>Fairway Information Services (FIS)</td>
<td>Info about bridges, locks, navigation channel, waterlevels, ...</td>
</tr>
<tr>
<td>Traffic Information (TI)</td>
<td>Tactical and strategic traffic information</td>
</tr>
<tr>
<td>Traffic Management (TM)</td>
<td>Object planning (locks, bridges, ...)</td>
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<tr>
<td>Calamity Abatement Support (CAS)</td>
<td>Information for rescue services</td>
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</tbody>
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## PIANC WG 125

<table>
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<th>Transport related services</th>
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<tbody>
<tr>
<td>Information for Transport Logistics (ITL)</td>
<td>Voyage planning &amp; ETA’s</td>
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<tr>
<td>Information for law enforcement (ILE)</td>
<td>Detect &amp; inform in case of oblivion</td>
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<tr>
<td>Waterway Charges (CHD)</td>
<td>Support the collection of voyage and cargo data</td>
</tr>
<tr>
<td>Statistics (ST)</td>
<td>Information for (a) management decisions (b) Operational decisions</td>
</tr>
</tbody>
</table>
Overview of published reports

GUIDELINES 2011

• Approach based on R&D results
• Inspiration for corridor approach

GUIDELINES 2019

• Approach based on implementation results
• Focus on corridor approach, maritime influences and worldwide approach
• Technical and operation services
Life cycle of RIS

WG125

Concept
Research
Implementation
Pilots
INDRIS
COMPRIS
IRIS I
IRIS II
IRIS III
CoRISMa

COMEX
Identifying the challenges
A. Current transport needs

Physical transport is increasing due to growing demand of goods

Online international freight marketplaces are trying to make freight pricing between transport modes transparent.

Already operational for maritime, road and air transport, but why is inland navigation still missing?
A. Current transport needs

Make inland navigation as competitive as road, rail and air transport

What is currently missing related to data and information needs?

**Challenge 1:** Can we provide new services to support current transport needs?
B. New technologies

New technologies (IoT, A.I., 5G, object recognition, new sensors, ...) can support RIS to realize new services

New technologies = new (security) threats

**Challenge 2:** how can we deal with new technologies and threats?
C. New concepts

New **global** and **worldwide** transport concepts, like the Physical Internet/synchromodality, are pushing new requirements towards different transport modes.

**Challenge 3:** how do we organize inland navigation to hook into a global Physical Internet?
Closing the gaps
Building on the waterway of tomorrow
Map on WG 125

Physical Internet
- Investigate the opportunities and the needs to enable the Physical Internet

Smart Shipping
- Investigate the opportunities and the needs to enable Smart Shipping

Smart Infrastructure
- Investigate the opportunities and the needs to enable a Smart Infrastructure

WG 125 - RIS
- Collect data and information needs from practical use cases.
- Elaborate services based on research and knowledge gained from other transport modes.
- Define or update existing services and technologies to support practical use cases.
- And finally the implementations of these use cases in a worldwide harmonized way making Inland Navigation synchronomodal ready

ITS
- Road approach

ERTMS
- Rail approach

e-Navigation
- Maritime approach

Similarities, lessons learned & ideas - Establish sustainable partnership
WG 125 – Work Programme

• Setup and approval of approach and framework (30th of September)

• Defined high level milestones:
  – MS1: Work programme (more detail in framework)
  – MS2: Table of Content
    • Define tasks based on (future) challenges
    • Define task owners and members
    • Combine output of tasks in Report
  – MS3: final draft report
River Information Services - Open public consultation - Have your say!

Dear supporters and enthusiasts of inland navigation and river information services,

As you might have heard, the European Commission is currently conducting an evaluation of Directive 2005/44/EC on harmonised river information services. Extensive stakeholder consultation activities form an integral part of this evaluation, ranging from very detailed questionnaires and interviews to open public consultation activities. On 8 August we have launched the open public consultation, where every interested citizen and organisation has the possibility to express their opinion by filling a short and easy to answer questionnaire, available in all languages of the European Union.


Your contributions are of great value to us as they allow us to better understand how the framework of the Directive plays out in the everyday life of the sector. Your responses and any submitted evidence will feed directly into the retrospective assessment (evaluation) of the RIS Directive. In addition, the results of all stakeholder consultation activities will be published as an annex to the evaluation on DG MOVE’s website for inland waterways (European Commission > Transport > Transport modes > Inland waterways) once the Commission’s evaluation is finalised.

I am looking forward to your opinions, and I thank you for your contributions in advance.
Contact details
ENHANCING ACCESSIBILITY AND USABILITY OF AUTOMATIC IDENTIFICATION SYSTEM (AIS) DATA

Authors: Supriti Jaya Ghosh  
U.S. Committee on the Marine Transportation System  
Brian Tetreault  
U.S. Army Corps of Engineers
# Federal Roles in the MTS

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<th>FEDERAL INTEREST</th>
<th>MAJOR CATEGORIES</th>
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</tbody>
</table>
Objective

• Assess gaps and challenges in the accessibility and usability of historic, terrestrial AIS data in the U.S. Federal Government.

• Eliminate overlaps and share resources, capabilities, and expertise.
AIS Data Flow

1. USACE LOMA
2. Data Storage
3. Internet
4. Web services
5. Data request
6. Internet
# Federal Role and Application

<table>
<thead>
<tr>
<th>Federal Agency</th>
<th>AIS Lifecycle Role</th>
<th>Application</th>
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<td>USACE</td>
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<tr>
<td>USCG</td>
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</table>
The Value of AIS Information and Collaboration
Methodology for assessing Accessibility and Usability

**Accessibility:** user capacity to ingest and access data

**Usability:** user access to information produced from the data and the processes used to create information products
Components of the Problem

Accessibility and usability of AIS information is impaired by challenges associated with:

1. Access to Data,
2. Validity of Data,
3. Data Management, and
4. End User Support.
Short Term Recommendations

1. Better define and articulate the value proposition of open and easy access to AIS data across the Federal Government and public stakeholders.

2. Expand options for user access to AIS data by leveraging existing data dissemination capabilities, such as the MarineCadastre.gov platform.

3. Increase awareness of existing AIS tools that enable AIS information accessibility and usability.

4. Improve the usability of AIS-derived information products by establishing links to external data sources.

5. Identify geographic and temporal coverage gaps in U.S. AIS data and develop plans to fill them.
An Ocean of Information
A joint BOEM and NOAA initiative providing authoritative data to meet the needs of the offshore energy and marine planning communities.

Features

Vessel Traffic (AIS) Data
OceanReports Video
OceanReports
Enhanced RIS through Enhanced AIS Accessibility and Usability

- Better awareness of vessel movement can help understanding of maritime infrastructure usage and needs
- Characterizing big data challenges
- Valuing interagency cooperation for the benefit of public stakeholders
Questions?

Authors:
Jaya Ghosh, CMTS, Jaya.Ghosh@cmts.gov
Brian Tetreault, USACE, Brian.J.Tetreault@usace.army.mil

www.cmts.gov
Facebook /USCMTS
Twitter @USCMTS
Automatic Identification System (AIS) 101

Ship - Ship
Situational Awareness

Ship - Shore
Monitoring, reporting

Shore - Ship
Navigation info.

Station Ashore
RHINE PORTS INFORMATION SYSTEM – A FRONT RUNNING PORT COMMUNITY SYSTEM IN EUROPE

Author: Emilie GRAVIER
Port of Strasbourg
1) Rhine – Alps
2) North Sea - Mediterranean Sea
3) Atlantic
4) Rhine - Danube
THE UPPER RHINE PORTS COOPERATION

- 9 inland ports with 50 millions of tons of annual waterborne traffic
- Intersection of 4 Core network corridors
- Cooperation set up in 2012
- Support of TEN-T and CEF programmes

Strategic objectives:
- Competitiveness gain through cooperation
- Efficiency gain for multimodal transport
- Enhancement of corridor capacity through common digital infrastructures
CREATING SYNERGIES BETWEEN EU-FUNDED ACTIONS

2012-2014: TEN-T « Upper Rhine, a connected corridor »

Evaluation of the potential for cooperation of the Upper Rhine Ports in the field of capacity

2011-2015 Interreg IV B « Connecting Citizen Ports 21 »

Specification of a RheinPorts Information System

2015-2018 TEN-T « Upper Rhine River Information System »

Pilot deployment of a River Information System in the Upper Rhine

2019-2022 INTERREG « RPIS 4.0 »
RPIS - INLAND PORT COMMUNITY SYSTEM
BARGE CALL COORDINATION
REAL-TIME POSITIONNING (AIS)

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<td>EGER</td>
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Passages

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<td>Bréfendon (IN)</td>
<td>31-01 18:53</td>
<td>AIS</td>
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<tr>
<td>Bréfendon écluse (OUT)</td>
<td>31-01 18:53</td>
<td>AIS</td>
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<tr>
<td>Bréfendon écluse (IN)</td>
<td>31-01 18:28</td>
<td>AIS</td>
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<tr>
<td>Kleinmünzing (OUT)</td>
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<tr>
<td>Kleinmünzing (IN)</td>
<td>31-01 16:56</td>
<td>AIS</td>
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<tr>
<td>Wal am Rhein (OUT)</td>
<td>31-01 14:56</td>
<td>AIS</td>
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<td>Wal am Rhein (IN)</td>
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<td>Keben écluse (OUT)</td>
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Exécute

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<td>SWISSTERMINAL BREFENDON</td>
<td>01-02-01:00</td>
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FOSTER RESILIENCE OF THE TRANSPORT NETWORK: FACILITATE MODAL SHIFT THROUGH DIGITALIZATION

OVERALL TRANSPORT

Rastatt incidence on IWT
+ 6 %

Low flow incidence on WT:
- 26 %

2016 2017 2018

+ 2 % + 2 %

No incidence on rail

CONTAINER TRANSPORT

Rastatt: no incidence on IWT

Low flow incidence on IWT

2016 2017 2018

+ 1 %

Rail:
+ 7 %

Rail:
+ 13 %

- 38 %

multimodal transport (t)
waterborne transport (t)
railway transport (t)

multimodal container transport (TEU)
waterborne container transport (TEU)
railway container transport (TEU)
TOWARDS RPIS 4.0

1. Extended RPIS:
   - functional extension of RPIS
   - feasibility study

   Dry Bulk
   Liquid Bulk
   Cruise Ships
   Railway

2. Smarter RPIS
   - new digital services for the actors in inland waterway transport

   Port Services
   Real time traffic data
   Interface with European PCS

3. Sustainable RPIS
   - foundation of a common company
IMPLEMENTING RIVER INFORMATION SERVICES (RIS)  
- LESSONS LEARNED FROM THE RHINE

Authors: Gernot Pauli, Marlène Hirtz, Jean-Noël Schilling

CCNR

- Governs navigation on the Rhine
- Oldest international organisation (200 years)
- Based on Mannheim Convention (150 years)
- Freedom, promotion, safety of navigation
- Binding regulations (traffic / vessel operation, technical requirements for vessels, crew qualification, manning)
- Rhine regulations blueprint for others
- CCNR regulations complementary to or harmonized with EU regulations
- CCNR strategy on RIS since 2012
- Mannheim Declaration of 2018 demanding further ICT development for inland navigation
The Rhine
884 km navigable length
330 million tons/year
2 million TEU/year
International fleet NL, D, BE, CH, FR, ...
300 vessels per day on lower Rhine

CCNR 20 years of support for development of RIS and their implementation on the Rhine

1996  IMO-, IHO-, IEC-Standards for maritimes ECDIS (Electronic Chart Display and Information System)
1998  Ad hoc Working Group Inland ECDIS
2001  Inland ECDIS Standard 1.0
2012  Inland ECDIS Standard 2.3
2014  Mandatory installation of Inland AIS and Inland ECDIS devices or comparable electronic chart display devices

New idea

Innovation
2 RIS IMPLEMENTATION PROCESS

Implementation cycle

- Amendment of regulations and processes
- Based on Mannheim Declaration, CCNR's RIS Strategy, bi-annual work programme
- Monitoring, statistics, online-surveys, feedback from stakeholders
- Amendment of regulations, communication activities to inform skippers & ship-owners, provision of particular software, helpdesks

3 AUTOMATIC IDENTIFICATION SYSTEM - AIS

Planning

- Inland AIS not a river information service but as RIS technical service a prerequisite for several services
- Most importantly, AIS provides additional information for skipper supporting his navigation tasks, thereby improving safety
- Mandatory introduction of Inland AIS = priority item CCNR' RIS Strategy

Summary of the CCNR's RIS strategy
The highest priority measures aim, in particular, to:
- Improve Inland ECDIS and to augment the official electronic navigational charts for the Rhine,
- Introduce Inland AIS and Inland ECDIS as mandatory on the Rhine from the end of 2013 and from the end of 2015 respectively,
- Clarify the regulations for the approval of automatic track control systems for navigation on the Rhine.
**Execution**

- CCNR introduced on 1 December 2014 obligation to install and to use Inland AIS devices and Inland ECDIS devices or comparable electronic chart display devices
- Obligation defined in Rhine Police Regulations (article 4.07)
- Information document published by CCNR for crew, answering concrete questions

**Verification**

- 2016 CCNR online survey on implementation of obligation
  - to best assess the difficulties and problems encountered by users
  - to enable those affected to make proposals for improvements
- 1400 fully / partially completed questionnaires
- 90% by skippers (others equipment installation companies, waterway administrations and police services)
- Survey’s findings analysed with more than 100 questions and answers
- Published for widespread dissemination
4 ELECTRONIC REPORTING

Context

- Rhine Police Regulations defines reporting requirements (article 12.01)
- Initially, only vessels and convoys carrying 20 or more containers had to report electronically
- 2015 electronic reporting mandatory for all vessels and convoys carrying containers
- 2018 electronic reporting mandatory for vessels with fixed cargo tanks
- Reduction of administrative workload for skippers and improved safety of navigation by having critical data available at all times in accurate fashion

Implementation

- First electronic reporting obligation initially foreseen for April 2008, because of difficulties postponed to January 2010
- Ensuring that all national databases involved in the data exchange use the same reference data
- Joint interpretation of technical standards as they leave margins for interpretation
- Adaptation of dedicated national ICT systems for proper cross-border functioning
**Electronic Reporting**

**Communication**

Learning from failures and successes and following recommendations resulting from experiences, enormous emphasis on public communication

- Information banners
- Webpage
- “Newspaper”

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[Image link to: https://binnenvaart.org/voorlichting-lobby-en-onderzoek/gratis-actiekrant-over-elektronisch-melden/]

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5 CONCLUSIONS

Conclusions

• ICT systems for public safety highly complex and sensitive
• Cross border implementation multiplies complexity and sensitivity
• Requires well functional international cooperation supported by highly engaged and cooperative experts

• Holistic approach necessary
  ✓ involving all countries
  ✓ working closely with stakeholders
  ✓ going beyond technical and legal issues
  ✓ putting a strong emphasis on communication

• CCNR’s ability to fulfill above-mentioned conditions allowed users and other stakeholders to accept and even support implementation and obligatory use of Inland AIS and electronic reporting
• Neither feedback from survey nor preparatory work of further expansion of electronic reporting showed strong reservations of stakeholders towards those services or RIS

Thanks for your attention!

Gernot Pauli  g.pauli@ccr-zkr.org  www.ccr-zkr.org
Chefingenieur  Tel.: +33 3 88 52 20 10  www.cesni.eu
THE INTRODUCTION OF AIS ATONS ON THE RIVER DANUBE

Author: Juergen TROEGL
viadonau / Austria
Agenda

- Definitions
- Why Smart AtoNs?
- How to chose the right technology?
- Implementation in Austria
- Smart AtoNs in the field and on board
- First results and outlook
- Conclusions
Definitions

• Aid to Navigation (AtoN)
  the physical AtoN (buoy, sign, light)

• AIS AtoN
  AtoN information transmitted electronically (over AIS)
  • Physical – AIS transmitter on buoy
  • Synthetic – communication device on buoy, AIS transmission through base station

• Inland AIS AtoN
  Extension of the maritime AIS AtoN definition with inland features (for Europe)

→ “Smart AtoN” as umbrella term
Why Smart AtoNs?

Safety of Navigation

- Unambiguous information intended location and type of AtoN, independent of weather conditions
- Information about actual position of floating AtoNs
- Monitoring of battery status of lights

Smart Waterway management

- Less regular inspections of AtoNs (reduction of effort)
- Fast reaction in case of displacements, damage or theft (increase of quality)
- Identification of originator of damage to floating AtoNs (reduction of costs)
Physical vs. Synthetic AIS AtoN
Physical vs. Synthetic AIS AtoN

→ Field pilot with physical and synthetic AIS AtoNs
Pros and cons physical AIS AtoN

Pro

• Battery (60 Ahrs!) operation lasted longer than expected
• Easy to manage and integrate
• Good position accuracy
• Reliable communication over AIS, free of charge

Con

• Very high investment costs
• Bulky and heavy device → topheavy → stronger tilt
• Very high damage risk in combination with driftwood and vessel collisions
• Limited AIS coverage area
Pros and cons synthetic AIS AtoN

Pro

• Very affordable
• Small, lightweight and easy to install
• Lower risk of physical damage
• Energy autonomous
• Very good AIS coverage

Con

• Lower update frequency
• Lower position accuracy due to fewer pos. fixes
• Causes communication costs
Technology decision*

AtoN monitoring

AIS network

Y

Y

Mobile network

Y

Pwr. consumpt.

hi

Pwr. consumpt.

lo

AIS type 3

aut.

aut.

AIS type 3

Coverage area

Y

hi

lo

Maint. effort

lo

Synthetic satellite

Synthetic terrestrial

AIS type 1

N

N

N

N

Mobile network

Y

Synthetic terrestrial

Synthetic satellite

Invest. costs

lo

hi

Synthetic satellite

AIS type 1

* simplified
Framework

• approx. 200 buoys and 150 lights
• Integrated solution for lights (solar lamps + monitoring)
• Low investment costs
• Energy autonomous operation
• Reliable communication (event based)
• Seamless AIS network
• Easy to use for field personnel

→ Synthetic AIS AtoN using satellite communication
Synthetic AIS AtoNs in the field
Management of synthetic AIS AtoNs
Improved display of AIS AtoNs on board

- Replacing static IENC buoy object with “intelligent” AIS symbol
- Avoiding clutter

<table>
<thead>
<tr>
<th>On position</th>
<th>Off position</th>
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<tbody>
<tr>
<td>Match with IENC object</td>
<td>Missing</td>
</tr>
<tr>
<td></td>
<td>Set IENC position</td>
</tr>
<tr>
<td>No match with IENC object</td>
<td></td>
</tr>
<tr>
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<td>footnote *1</td>
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</table>

Virtual AtoN | Not applicable |
Improved display of AIS AtoNs on board

1 green buoy no AIS
1 smart green buoy, on-pos
1 smart red buoy, on-pos

1 green buoy no AIS
1 smart green buoy, on-pos
1 smart red buoy, off-pos
First results and outlook

- Easy to deploy solution
- Good overview of assets (on shore and floating)
- Active alarming in case of problems
- Inconveniences from false alarms
- Tricky selection of geofence for off-position alarm
- Outlook: use of accelerometer to detect impacts
- Future use of virtual AtoNs
  - Short term situations
  - Replacement of buoys after flood or in ice season
  - Requires mandatory IECDIS on board
Conclusions

- Smart AtoNs for safety of navigation and efficient AtoN management
- Technical solutions for all kinds of environments
- Know what you want before choosing technology
- Energy autonomy is an important factor
- Physical AIS AtoNs require larger and stable buoys
- In the future virtual AtoNs may replace physical AtoNs under certain conditions
Thank you for listening!

Juergen.TROEGL@viadonau.org
RIS COMEX ELBE-WESER CORRIDOR

Author: Stefan Bober, Wieland Haupt
Federal Waterway and Shipping Administration
Safety of Navigation
- Improved by AIS AtoN messages

- AIS AtoN and Inland ECDIS are suitable technical standards to improve safety of navigation. All the more when these standards are used in combined applications.
- The aim is to inform the skippers about the current situation via the Inland ECDIS chart on board of the vessels.
European Project RIS COMEX
- Sub Activity 5.1: Safety of Navigation

- Within the frame of the European RIS COMEX project are reference applications foreseen.
- The main test field is the “Elbe-Weser” corridor.
- The necessary tech will be installed for the field testing of AIS AtoN.
- Both types of AIS AtoN, the “Real AIS AtoN” and the “Virtual AIS AtoN” will be applied.
- AIS AtoN messages offer the possibility to inform the skippers immediately about current dangerous situations on the track.
Reference application AIS AtoN

- Preconditions

- Extending the Inland AIS shore infrastructure.
- Amending the existing AIS data management in order to provide the specific AIS AtoN messages.
- Amending the already working environment for managing, providing and monitoring AIS AtoN.
- Amending the Inland ECDIS onboard systems in cooperation with the Inland ECDIS manufacturers to receive the specific AIS AtoN messages and to visualize them in the system on board.

The investment is about 900,000 €

The project is co-financed by the European Union.
Reference application AIS AtoN
- Real AIS AtoN

- Buoys and beacons:
  - Existing as real objects
  - Equipped with transponders that regularly send condition and position via AIS
- Purpose: marking durable situations
- Inland ECDIS charts: “Real AtoN” have to be encoded
Reference application AIS AtoN
- Real AIS AtoN

- Visualization in Inland ECDIS:
  - Case „on position“: point object with current position
  - Case „off position“:
    - "missing – symbol" at required position
    - "off position – symbol" at actual position
Reference application AIS AtoN

- Virtual AIS AtoN

- Virtual buoys, beacons, line and area objects, provided via AIS land infrastructure:
  - Digital projections, not existing as real objects
- Purpose: marking temporary situations (restrictions) and/or dangerous spots
- Inland ECDIS charts: “Virtual AIS AtoN” are not provided by Inland ECDIS charts, only via AIS messages
- Visualization in Inland ECDIS chart on board:
  - as point, line or area
Reference application AIS AtoN, examples
- Recommended tracks in specific shallow sections

Construction of a recommended track
Visualized in Inland ECDIS
Reference application AIS AtoN, examples
- Indication of a virtual caution area while a cable ferry is crossing

Cable ferry at the river Elbe

Virtual caution area while the ferry is crossing
Reference application AIS AtoN, examples

- Indication of currently limited vertical clearance under bridges (pending on water level)

Bridge at the river Elbe

Reference gauge

Virtual caution area is indicating low vertical clearance
Reference application AIS AtoN, examples
- Indication of the current switching status of signals with the direction of impact

Current switching the signal

Signal outside

Status visualized in Inland ECDIS
For the navigation at inland waterways the availability of reliable and complete information about the current navigational conditions and restrictions are essential.

This information need affects several aspects and aims:

- To improve the safety of navigation
- To ease voyage planning and to support traffic execution, e.g. to avoid waiting times at locks and harbours
THANK YOU FOR YOUR KIND ATTENTION!

Stefan.Bober@wsv.bund.de
Wieland.Haupt@wsv.bund.de