Paper 134 – RIS Implementation in Poland

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ABSTRACT: RIS is an instrument for the organisation and management of inland waterway transport. It is a service package in a broad meaning which makes use of modern technology in order to optimise traffic and transport flows. This system allows to increase the navigation safety and effectiveness by providing up-to-date information both to skippers – who based on it can make decisions concerning cruise parameters (e.g. velocity) – and to ship owners who can plan the use of their fleet more effectively. RIS also enhances the flow of information between the managers/supervisors of the waterway and its users, allowing for better enforcement of the law or gathering statistical data. It facilitates calculating port charges and charges for the use of waterways. The aim of this article is to discuss the process of RIS implementation in Poland and to present how it may be developed.

1 INTRODUCTION

Inland navigation is one of the most neglected branches of transport in Poland. Despite its undeniable advantages, such as the capability to transport goods of considerable mass and volume, the lowest transport cost for an individual item, minor impact on natural environment and therefore low external costs, inland navigation does not play a significant role in transport business in Poland.

It results first and foremost from the appallingly bad technical condition of the waterway infrastructure, whose maintenance has not been conducted or financed properly for decades. To support this claim, one can refer to the fact that in the period of 1945-1948, when the damages to the waterways caused by the second world war had been repaired, more investment works had been done than during the following 60 years.[1]

Moreover, inland navigation has undergone great metamorphoses in the meantime and it no longer consists only in the physical ability to transport goods from one point to another. Transport has become a link in a logistics chain, with its complex system of mutual connections between many subjects.

Modern logistic transport management requires therefore constant exchange of information between the many partners and operators in the logistics chain. The use of state-of-the-art technologies allows for better organisation and management of the transport on inland waterways and for the optimisation of the use of existing infrastructure and fleet.

One of the key technologies enhancing the attractiveness of water transport and enabling its fuller integration with other links of intermodal transport is the system of harmonised River Information Services (RIS).

2. RIS – INFORMATION PROVIDING SYSTEM

[1] Woś, K. 2010, Żegluga Śródlądowa w Polsce – szanse rozwoju". (Inland navigation in Poland – development opportunities) Maritime Academy in Szczecin, p. 7

RIS may be defined as a service package in a broad meaning with various services aimed at optimising traffic and transport flows.

RIS uses common systems to join pilots, transport companies, operators of locks, ports and terminals, RIS operators, offices supervising waterways and emergency services.

A skipper or any other RIS user may receive detailed information about every waterway and even for every part of a given waterway.

This information may be gathered, processed and sent to end users by means of many instruments and technologies. Some information may be processed with the use of various technologies and the choice of a given one may depend on many factors (e.g. whether it is time- or capital-consuming, local conditions, maintenance costs).

What instruments and technologies are used depends on the following:

- **the scope of basic information** – for each waterway one may point a certain minimum scope of information necessary for ensuring navigation safety, which in all conditions will be vital in order to carry out services at a minimum level (e.g. name of the vessel, its dimensions and position) and information which is necessary only on given parts of the waterway (e.g. working time for locks or port charges)

- **the scope of additional information –** information which is not vital but is implemented by RIS Centres in order to increase the system functionality on users' request (statistical data, applications allowing to reduce fuel consumption)

- **accuracy –** the accuracy of the information necessary to ensure the navigation safety depends mostly on the situation on the waterway (e.g. for greater depths 1 m accuracy is sufficient, smaller depths require a few centimetres' accuracy)

- **relevance –** that is, how soon a given piece of information becomes obsolete. This heavily depends on the accuracy of information – the higher the accuracy (e.g. of water levels), the sooner it becomes obsolete

- **usefulness** – that is whether a given piece of information is vital and/or useful for the users in order to perform their tasks. One should distinguish here between vital information which is indispensable and it is impossible to replace it with another, and useful information which is needed in order to increase the relevance or certainty of the information

- **certainty** – which may be defined as the conviction of an operator/user that the data has been gathered correctly and/or the information acquired on its basis has been developed properly and reliably.

The information is supplied to the RIS users in the form of various services, available on the Internet on special information portals, dedicated devices and applications and traditionally, e.g. via VHF. The most popular are:

1. Notices to Skippers
2. Electronic Reporting International
3. Vessel Tracking and Tracing
4. IENC, Inland Electronic Navigational Chart
5. Calamity Abatement Support

3. RIS IN EUROPE AND POLAND

There is no unified definition of the RIS system in Europe. According to Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005, RIS may be defined as harmonised information services to support traffic and transport management in inland navigation. Each member state implementing the RIS system

decides independently to which extent the system will be implemented.

The EU legislation sets out only basic functions and tasks and develops common procedures to provide services.

In order to enable international exchange of information necessary for the proper provision of river information services, the harmonised Quality of Information Services have been developed. In the framework of many international projects, common standards of data used in electronic applications have been developed so that they are compatible with all telematic systems, both inland and maritime.[2]

To achieve this, 4 European RIS expert groups have been appointed and they meet semi-annually at the events called RIS Weeks in various European countries. These expert groups are:

1. Inland ECDIS Expert Group
2. ERI Expert Group
3. NtS Expert Group
4. VTT Expert Group

The results of the works of expert groups are published on the ris.eu portal, which is also the main platform for exchanging information and experience in implementing RIS system in Europe.

3.1 PILOT IMPLEMENTATION ON THE LOWER ODER RIS

The necessity to have the harmonised river information services implemented by the end of 2013 arises from the provisions of Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005. By virtue of this directive, EU member states were obliged to adapt the RIS system on all waterways belonging to class IV (or higher), if they are connected to other waterways of the same class. In Poland, only the lower part of the Oder river meets these standards and hence the implementation of the RIS system was required.

Optionally, member states may also implement the system on other waterways if they consider it justified. Polish authorities decided to implement the RIS system only on the obligatory part in the first stage and extend this area at a later time.

According to the Act of 10 Jun 2011 amending the act on inland navigation and the act amending the act on inland navigation (Journal of Laws Dz. U. 2011 No 168, item 1003), the entity responsible for the implementation of the RIS system in Poland is the Inland Navigation Office in Szczecin, which is an administrative unit reporting to the minister responsible for transport.

The first stage of RIS implementation in Poland was carried out as part of the project "Pilot Implementation on the Lower Oder RIS" co-financed by the TEN-T fund [No 2010-PL-70206-P], on the basis of the Commission Decision of 10 Dec 2012 No C(2012)9020 and assumed that the RIS system will be implemented on the minimum level required by Directive 2005/44/EC of the European Parliament.

According to the Commission Decision of 28 Jun 2011 No K(2011)4584, Pilot implementation on the Lower Oder RIS was divided into three tasks:

1. Task 1 – the preparation of a feasibility study and the functional and utility programme for the pilot implementation on the Lower Oder RIS,
2. Task 2 – the pilot implementation on the Lower Oder RIS, including the construction of the RIS Centre,
3. Task 3 – verification of the pilot implementation on the Lower Oder RIS.

Under Task 1 the feasibility study for the pilot implementation on the Lower Oder RIS was prepared in 2011 and the functional and utility study was prepared in 2012. Both documents constituted the basis for designing and constructing the RIS system in Poland.

Task 2, i.e. the design and construction of the RIS system, was divided into 3 stages:

[2] Durajczyk, P. 2011, Międzynarodowo koordynowana implementacja usług RIS w Europie na przykładzie projektu IRIS Europe" (The IRIS Project as an example of internationally coordinated RIS implementation in Europe) Logistyka 6/2011, p: 4648

- The construction of an inspection and measurement ship, along with necessary equipment to carry out bathymetric measurements.

- The delivery of vital equipment, including CCTV system components, hydro-meteorological sensors, radars, server along with telephone exchange, multibeam echo sounder along with independent RTK GPS/DGPS positioning system, satellite compass and specialist hydrographic software, VHF base stations, AIS base stations, specialist GIS software for the creation of Inland ENC and kits for the analysis of the radio spectrum and personal computers,

- The pilot implementation on the Lower Oder RIS, as part of which the general contractor designed communications system and the installation of devices in locations pointed to in the Functional and Utility Programme, adapted offices for the purposes of the RIS Centre, installed all essential system components and integrated hardware and software.

The last stage of the RIS implementation in Poland consisted in carrying out an external audit whose aim was to verify whether the project had been carried out properly and whether it had met its objectives.

3.2 THE AREA COVERED BY THE RIS SYSTEM

The following waterways, beginning in the south in the town of Ognica and ending in the north at the border with the internal waters, have been part of the pilot implementation:

1. **Lake Dąbie** to the border with the internal waters – 9.5 km long
2. **The Oder river** from the town of Ognica to the Klucz-Ustowo Cutting and then as the Regalica river to Lake Dąbie – 44.6 km long
3. **The West Oder river**:
    a. From the weir in the town of Widuchowa (at the 704.1 km of the Oder river) to the border with the internal waters, together with side branches – 33.6 km long
    b. Klucz-Ustowo Cutting, joining the East Oder river with the West Oder river – 2.7 km long
    c. The Parnica River and Parnicki Cutting from the West Oder river to the border with the internal waters - 6.9 km long.

One should underscore that the northern section of the Oder river, from the port of Szczecin to the mouth of the Baltic Sea constitute inland maritime waters and therefore is managed with the use of Vessel Traffic System (VTS).

3.3. THE ELEMENTS OF THE RIS SYSTEM IN POLAND

The basic communication takes place between the RIS Centre, where the system operators gather information from various public institutions (such as Regional Water Management Authority or Institute of Meteorology and Water Management), waterways users (e.g. skippers) and system devices (water gauges, cameras, radars, hydro-meteorological stations), and skippers. Additionally, after further analysis, the information may be forwarded to:

- transport companies/ship owners – in order to increase the effectiveness of fleet management,
- freight forwarders – to facilitate the planning of goods transport, including intermodal transport,
- offices supervising the maintenance and modernisation of waterways (e.g. Regional Water Management Authority) – in order to plan necessary maintenance works and the development of the system and calculating charges for the use of the waterway,
- anti-crisis management centres – in order to coordinate rescue operations,
- the police – in order to enhance the enforcement of the law and help with planning rescue operations and chases,

- port, marina and terminal managers – in order to optimise the use of parking/mooring space and to calculate port charges,
- fire brigades – to coordinate rescue operations,
- border guards – in order to plan the controls of ships and their crews,
- Central Statistical Office – as an additional source of information, e.g. on traffic flows.

The RIS system in Poland is based on the following technical solutions:

1. **Automatic Identification System (AIS)**, which consists of two base stations, located in the northern (Grain Silo Ewa) and southern (Widuchowa weir) part of the area covered by the actions of the RIS Centre.

2. **CCTV system**, which consists of 34 cameras (including 3 PTZ cameras with the possibility to zoom in and zoom out), installed in the most crucial places. The cameras have been installed at the entry and the exit of the RIS-controlled area. Since in Poland there is no obligation to have the AIS installed, those cameras are the main source of information on vessels entering the RIS-controlled area. Moreover, the cameras have been installed in all locations identified as potentially dangerous, i.e. at bridges and river bifurcations.

3. **System of radars**, which were installed as an additional source of information about vessel traffic on particularly dangerous sections of the rivers. As part of the pilot implementation, 12 short-range observation radars of low radio waves emission have been installed at bridges.

4. **A system of meteorological sensors,** which consists of 4 devices. They allow to monitor wind speed and direction, the amount and intensity of precipitation, temperature, atmospheric pressure. This information is presented on the information portal of the Inland Navigation Office in Szczecin and is archived, which will allow specialist analysis in the future.

5. **A system of hydrological sensors**, which consists of 1 microwave water gauge measuring water levels. When these values are compared to reference values, it is possible to calculate very precisely vertical clearances below bridges, which constitute the main obstacle in inland navigation on the Lower Oder.

6. **Differential global positioning system (DGPS),** which allows to localise vessels with the accuracy of a few centimetres.

7. **VHF communication system,** which enables voice communication between skippers and RIS operators on the entire RIS area in Poland.

8. **Internet information portal of the Inland Navigation Office in Szczecin**, (www.szczecin.uzs.gov.pl), where one may find all information concerning waterways, conditions of navigation and current provisions. All RIS user may also download current electronic navigational charts for free.

The table below presents the location of sensors on the Lower Oder RIS.

Fig. Sensor location on the Lower Oder RIS

River	km	Meteo	Hydro	CCTV	Radar
West Oder	35.95		2	2	
West Oder	35.59		2	2	1
West Oder	34.70	1		2	1
West Oder	31.17			2	
West Oder	25.40			2	2
West Oder	14.65		2	2	2
Oder	704.10	1		2	1
Regalica	737.70	1		2	
Regalica	737.10		1	1	1
Regalica	734.50		1	2	1
Regalica	734.00			2	
Regalica	733.70			1	
East Oder	727.95			2	2
East Oder	718.18	1	2	3	
Oder	697.00			2	1
Parnica	4.45		2	2	
Parnica	4.00		2	2	
West Oder				1	
	TOTAL	4	14	34	12

The RIS system in Poland consists of the following elements:

- **Inland Electronic Navigational Charts [Inland ENC],** which are created in the highest, currently binding standard 2.3 and are available freely on the website. The Polish RIS Centre has at its disposal the entire production and distribution line for electronic navigational charts, including a measurement and inspection vessel equipped with a multibeam echo sounder and necessary software to carry out bathymetric measurements. Charts are updated as needed and their validity (e.g. the location of navigation beacons) is revised by RIS operators at least once every month.

- **Notices to Skippers – NtS**, which provide information about traffic and waterways, water levels, weather reports, and in winter – ice reports. The information is prepared in Poland by Regional Water Management Authority, which according to the act[3], is responsible for ensuring the maintenance of beds of natural watercourses and canals and for regulating water levels.

- **Vessel Tracking and Tracing – VTT,** which is used for constant monitoring of water traffic and transferring information to appropriate institutions and agencies. In Poland skippers make decisions concerning navigation independently, therefore RIS operators may not give navigation orders or recommendations.

- **Electronic Reporting International (ERI)** – which is currently being tested. This system, thanks to a special application, allows skippers to report they journeys and provide information required by law (e.g. on the crew, goods carried, destination port, etc.). It is considered that in the future all vessels will have to report electronically before they enter the RIS-controlled area.

[3] The Act of 18 Jul 2001 Water Law (i.e. Journal of Laws 2015, item 469 as amended)

3.4 CHALLENGES OF THE PILOT IMPLEMENTATION ON THE LOWER ODER RIS

Carrying out the pilot RIS implementation constituted a great challenge for the Inland Navigation Office in Szczecin. The challenge was made even more difficult due to the short time provided for the project (since the project was co-financed by the European Union, it had to be finished by the end of 2013) and the fact that the whole project followed the critical path as all tasks in the project had to be carried out in a certain sequence.

Challenges of the RIS implementation on the Lower Oder may divided into three categories:

- technical challenges,
- legal challenges,
- organisational challenges.

3.4.1. TECHNICAL CHALLENGES

One of the biggest technical challenges of the RIS implementation in Poland was certainly providing appropriate infrastructure. It required installing a great many devices and often also constructing engineering structures such as masts and their connections to telecommunications and energy networks (the main problem was the lack of energy infrastructure which resulted in the need to provide power connections by power company as there was a considerable power demand).

Furthermore, another challenge was to ensure international interoperability and compatibility of systems, services and applications.

The last, still unresolved challenge, is providing vessels with devices and applications used to operate RIS.

Many EU member states have prepared special financial aid programmes for the necessary equipment. These programmes – compliant with

one of the basic EU rules stating that no entity will be discriminated against based on their place of origin – were designed to be used by all users of a given waterway, regardless of where the vessel has been registered. It allowed many Polish ship owners to buy this equipment on preferential terms. Nonetheless, there is still the need to provide Polish ship owners and skippers with the access to necessary equipment on preferential terms.

3.4.2. LEGAL CHALLENGES

Legal challenges of the RIS implementation included mostly complicated procedures and long waiting time for administrative consents and permission (including permission to connect devices to electrical network). Whether or not a particular permit would be given constituted one of the major threats to the timely execution of the project.

Moreover, one should point out that the necessity to conclude administrative agreements for the international exchange of RIS data was and still is a huge challenge. In view of special personal data protection, various legal regulations in member states, differences in competence of national RIS Centres and different approaches to the scope of necessary exchange of information, the process of completing these administrative arrangements may take 4-5 more years.

3.4.3 ORGANISATIONAL CHALLENGES

The main organisational challenge of the Pilot Implementation on the Lower Oder RIS was the necessity to build the RIS Centre from scratch.

There were no RIS specialists or experts in Poland and the Inland Navigation Office in Szczecin itself had no sufficient personnel who could be delegated to perform the tasks. What is more, the arbitrarily imposed limits of employment made it impossible at the early stage to employ the necessary amount of staff. Therefore, at the stage of the execution of the project it was vital not only to create the technical infrastructure but also to create all procedures for the functioning of the RIS Centre, employ and train future operators.

Moreover, we needed to provide:

- the right flow of baseline data essential to provide services,
- uninterrupted access to river information services for end users,
- high quality of services, compliant with the EU standards of Quality of Information Services.

3.5 COST-BENEFIT ANALYSIS

Due to limited research and a very short time of RIS Centre activity in Poland (it was officially launched in May 2014), it is difficult to assess clearly the cost and benefit ratio of the RIS implementation.

At the moment we do not have sufficient scientific data or user data (e.g. in the form of surveys) in order to fully assess the effectiveness of the new technology.

Only after completing the full RIS implementation and after ca. five years have passed since the launch of the system the first reliable analysis of the benefits of the RIS implementation for inland navigation in Poland will be possible.

It will be highly difficult to evaluate the financial gains from the RIS implementation as the services are provided for free and benefits resulting from reducing costs or reducing air pollution are difficult to estimate.

One should, however, assume that the main benefits for the RIS implementation are for the water management offices which, thanks to the information obtained via RIS system, may improve:

- law enforcement, e.g. punishments for stopping in a prohibited place or finding the facts in case of an accident
- navigation safety through continuous traffic supervision,
- Polish and German icebreaking actions on the Oder (thanks to CCTV images one may observe the ice cover and its movements and therefore optimise the action plan)
- gathering statistical data on traffic flows

The main benefit for RIS users is the free access to electronic navigational charts which will be supplemented with the bathymetric layer. Moreover, RIS have the access to hydrological and

meteorological information, which facilitates planning the journey.

4. PLANS FOR THE FUTURE – FULL IMPLEMENTATION ON THE LOWER ODER RIS

We are currently working on the development of the RIS system in Poland. It is planned that by the end of 2019 the area covered by the RIS system will have been enlarged and new serviced will be available for users.

The system will be created on the basis of the existing pilot implementation by supplementing it with further software and hardware modules and also further sensors.

The full implementation assumes that the system will be developed by adding the following elements:

- monitoring of navigation beacons with the use of AIS;
- water level predictions;
- legal bulletin;
- journey planning instruments;
- instruments enabling the harmonisation of the actions of emergency services in the RIS-controlled area;
- full equipment, programme and procedural integration with the marine VTS Szczecin system;
- multi-sensor data fusion;
- reports on incidents and accidents in the RIS-controlled area;
- increasing the system's functionality regarding the protection of natural environment;

In further stages of the RIS implementation in Poland it is also possible to propose a programme of subsidising DGPS receivers, Inland AIS and Inland ECDIS software for ship owners.

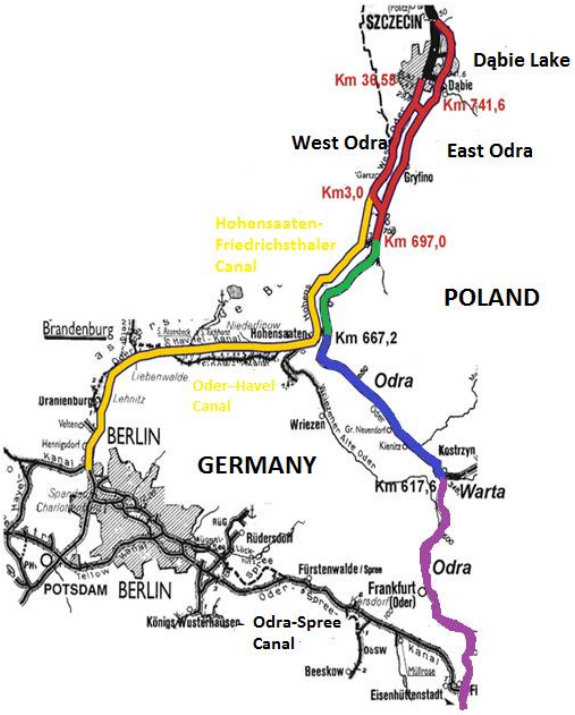
Three territorial variants of full RIS implementation have been developed:

1. The area covered by the RIS system will be enlarged by the section from the town of Ognica to the town of Hohensaaten, i.e. by 30 km to the south. It would allow the creation of a functional communication system which would connect the marine port in Szczecin via an inland port in Berlin with inland waterways in Europe.

2. The area covered by the RIS system will be enlarged by the whole lower section of the Oder, i.e. from the town of Kostrzyn to the town of Ognica.

3. The area covered by the RIS system will be enlarged by the whole border section of the Oder, from the mouth of the Lusatian Neisse, i.e. at the 542.4 km of the river, to the town of Ognica.

Fig. Full implementation on the Border and Lower RIS - variants[4]



On the chart:

- red colour shows the area of pilot implementation on the Lower Oder RIS (the area of the currently functioning RIS system),
- green colour shows the first variant of RIS development to the town of Hohensaaten;
- blue colour shows the second variant of enlarging the system by 50 km to the town of Kostrzyn;

[4] Author's own compilation based on: Wasserstrassen von Elbe bis Oder. Band 10a: Die Oder. Nagel's Nautic Verlag. Berlin 1993, s.3

- purple colour shows the third variant which covers the entire border section of the Oder river.

Full scope and objectives of the "Full implementation on the Lower Oder RIS" will be listed in the feasibility study and a functional and utility programme which will have been developed by the end of 2015.

5. CONCLUSION

Due to its characteristics and Poland's geographical location, inland navigation should be a preferred means of goods transport, especially mass transport. However, decades of underfunding have caused technical dilapidation of waterways and port infrastructure. River Information Services, with their relatively low implementation costs, may help improve transport via inland waterways and allow to fully use current navigation conditions.

It is too early to fully evaluate the potential of this new technology and analyse all benefits coming from its implementation. However, all analyses published so far show indisputably that river information services bring considerable macroeconomic profits. It is therefore essential for Poland to continue the development of the RIS system and to join the internationally harmonised RIS implementation in Europe and research on the future of river information services in the EU. It is particularly important to ensure Poland's participation in the works on European standards on the provision of river information services and on Quality of Information Services, which will take effect in the European Union in the future.

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  - PLATINA: http://www.naiades.info/platina/page.php?id=1
  - RISING:www.rising.eu
  - RIS in Europe: www.ris.eu