https://www.sworldjournal.com/index.php/swj/article/view/swj08-01-095
DOI: 10.30888/2663-5712.2021-08-01-095

УДК 652.01.52

REMOTE SIMULATOR DEVELOPMENT FOR RIS (RIVER INFORMATION SERVICE) OPERATORS

РАЗРАБОТКА УДАЛЕННЫХ СИМУЛЯТОРОВ ДЛЯ ОПЕРАТОРОВ РИС (РЕЧНАЯ ИНФОРМАЦИОННАЯ СЛУЖБА)

Kulbatsky A. A. /Кульбацкий А.А.
National University «Odessa Maritime Academy»,
Didrihsona 8, 65000
Национальный университет «Одесская морская академия»,
Одесса, Дидрихсона, 8 , 65000

Abstract. *River Information Services is the concept for information services in inland navigation to support traffic and transport management in inland navigation, including interfaces to other transport modes. The potential of RIS to put inland navigation in a better position in the transport chain was also recognized by international organisations like the United Nations Economic Commission for Europe (UNECE), several river Commissions like the Rhine and Danube Commissions and PIANC, the World Association for Waterborne Transport Infrastructure. Considering that RIS in Europe is deployed on all major inland waterways, it became necessary to train specialists for RIS operators. The article proposes a new training method using an integrated approach based on an Internet platform in the form of a game simultaneously with several participants located at a distance from each other.*

Key words: *River Information Services, to train specialists for RIS operators, the Rhine and Danube*

"It is more and more evident that Traffic Management will shift from safety management to a service that supports the logistic transport chain in a more intensive way, however without compromising the safety" [1]

The impetuous development and implementation of new technologies in shipping, requires the same impetuous development of personnel training processes to work in modern conditions. This notes we try to discusses a new modern method for training operators to control unmanned vessels at a remote distance.

This method guesses the creation of a great (main) simulator in which the main powerful unit is located in one central place, for example, a training center in Rotterdam (Netherlands), HYPACK Training Center (USA) or any others. This great block may consist of several connected modules. This is the navigation bridge, engine room, RIS center, etc.(fig.1)

Fig.1 Main simulator for IWW voyage

From the any cities/countries where located control segments that allow you to steering an unmanned vessel at a remote distance from its workplace. Such a control segment may consist of a computer, a monitor screen on which the controlled vessel is displayed, an Inland ECDIS electronic charts, an image of the navigation bridge or its duplicating components, such as a steering wheel, gyrocompass, echo sounder, etc.

The vessels selected in this case from the collection of library vessels available at the training center, for example in Rotterdam. You can work simultaneously with representatives from different cities, companies and countries, choosing each vessel for this and independently planning your voyage. In the process of movement of the vessel in case of its divergence with other vessels, it is possible to broadcast communicate with the operators of these vessels. All these actions are practiced in the Internet space through a dedicated communication channel.

It is assumed that the operator can control the vessel from the RIS center, where he/she receives all current information on the planned route of the vessel and makes adjustments to its movement. So, for example, it processes information regarding changes in the water level, taking into account the available mathematical models of the water surface. It takes into account possible changes in the position and size of the fairway, changes in silting of the bottom topography, etc. In some countries they are already very close to using unmanned vessels, however, even at the preliminary stage of preparation, they are faced with solving such possible problems.

This is a problem of mutual recognition of sound and light signaling of oncoming vessels in a situation when the vessels go towards each other in difficult sailing conditions, for example, one of them with the crew, and the other without it. For an unmanned vessel, for example, it is better to use virtual alarms and virtual AtoNs, but for a vessel with a crew, real ones.

The proposed method allows from one central simulator to conduct simultaneously trainings with several partners, where it is possible to set situations of varying complexity, as well as conduct communications between the direct participants in the training in real time. The central training center can make a timetable for the remote users to apply their simulator. So, there is no need for all training centers to purchase their own simulators, but you can buy advance time at the central training facility. The computer program evaluates the student’s actions, and it is unified and the same for everyone.

We propose to realize the principle of a business game at a distance. Consider now how to look like this game in some example.

The concept of development of distance learning, as well as tasks and methods for solving them. Fig.2 shows the general scheme and principle of operation of the proposed simulator. There we would like to show in the central part of the figure, an Internet server is shown, which can be located near the main simulator to ensure stable communication. You should also provide a dedicated Internet channel for training using satellite communications. Each remote user must have the appropriate equipment and software that will allow him to solve the necessary tasks.

The principal objectives of River Information Services are providing information to: (1) Contribute to safety of traffic and transport by:

- Reducing traffic and transport incidents and accidents;
- Reducing injuries;
- Reducing fatalities;
- Providing information for law enforcement and statistics.

(2) Contribute to *efficiency of traffic and* transport *by***:**

- Optimising the use of the capacity of waterways and prevention of traffic congestion;
- Optimising the carrying capacity of vessels;
- Enabling Just in Time transport by a better predictability of travel times ;
- Reduction of travel times and waiting times;

Reducing the workload and increasing situational awareness of RIS users;

- Reducing transport costs;
- Reducing fuel consumption;
- Improving the efficiency of harbours and terminals.

(3) Contribute to *environmentally friendly* transport by**:**

- Reducing environmental hazards;
- Reducing/detecting polluting emissions (in particular CO2) and spills due to accidents, illegal actions or normal operations.

(4) Make inland navigation a reliable, plannable and transparent transport mode in the multimodal transport chain.

These objectives should be met under the constraints that RIS is supplied in a manner that is ***reliable, cost efficient and legally sound***.

In the RIS arena the underneath defined decomposition is used to clarify the hierarchy of the RIS operational services, RIS functions and RIS information elements[6] and connected to that the RIS technical services – or as previously called RIS key technologies - used to produce, calculate, transport or compose the required RIS information elements and related functions and operational services. The RIS related information elements can be based on data from several sources and/or RIS technical services. These guidelines are restricted to the first three levels and will not further specify recommendations on data level.

A service provides and uses information. It supports the user in achieving an improvement in performance. Operational services support the user to achieve the objectives. The operational services defined in the context of RIS are given in Figure 3.1. where:

Fairway information (FIS) contains geographical, hydrological, and administrative information regarding the waterway (fairway) in the RIS area that is required by the RIS users to plan, execute and monitor a voyage. Fairway information is one way information: shore to ship or shore to office (users' office).

Tactical traffic information **(TTI)** is the information service affecting the skipper's or the VTS operator's immediate decisions with respect to navigation in the actual traffic situation and the close geographic surroundings. Tactical traffic information contains position and specific vessel information of all targets detected by a radar and presented on an electronic navigational chart, and enhanced by external traffic information, such as the information provided by AIS. TTI may be provided on board of a vessel or on shore, e. g. in a VTS

Strategic traffic information (STI) *is the information service affecting the medium and long term decisions of RIS stakeholders.* Strategic traffic information contributes to the planning decision capabilities regarding a safe and efficient voyage or transport. A strategic traffic image contains all relevant vessels in the RIS area with their characteristics, cargoes and positions, stored in a database and presented in a table or on an electronic charts.

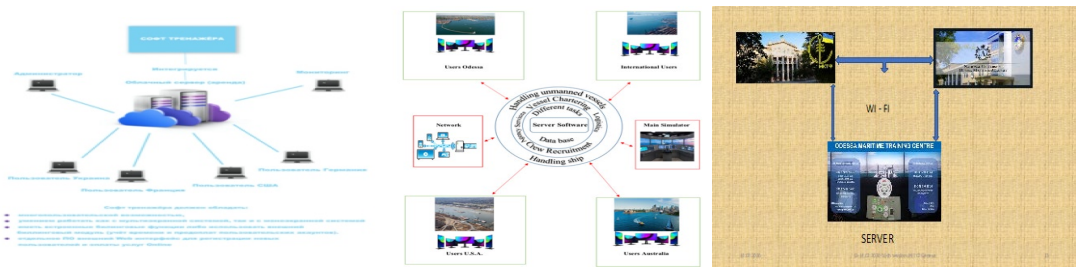

Fig.2 general schemes and principle of operation of the proposed simulator

Figures3 which you can see below shows an example segment for a remote any user. This segment can consist of a powerful computer, several monitors (preferably at least three), as well as a simulator of a navigational bridge in one of the variations shown in the figure3.

Fig.3 segments for remote RIS operator users

Consider a list of tasks that can be solved using the proposed system for training.

1. Chartering of ships. To do this, you must enter the database of vessels stored on the server. Then, draw up documents in accordance with the requirements of modernity. Select a vessel for transporting the intended cargo (Fig. 4)

A cargo owner needs cargo moved (or a ship operator needs an additional ship.)

- He engages a shipbroker who finds suitable ships.
- After meticulous checking of the ships, the charterer chooses a ship, and via the broker, makes a FIRST OFFER.
- The first offer includes charter/freight rates and other conditions
- The shipowner either accepts or rejects the offer.
- Further offers and counter-offers may lead to a charter being FIXED, i.e. the shipowner and the charterer agree to the charter, and a CHARTER PARTY (a special document) is signed by the owner and the charter
- All details in the charter party govern the charter.

Steering of the selected vessel in the sea and river traffic areas. Development of maneuvering tasks, anchoring, setting up to the berth in various weather conditions.

Steering of an remote autonomous cargo ship. In this case, it is possible to solve the problem of the divergence of an unmanned vessel and a vessel with a crew on board, considering the communication issues of these vessels. You can also consider the problem of orienting the ship in space with respect to virtual and physical AtoNs (fig.4).

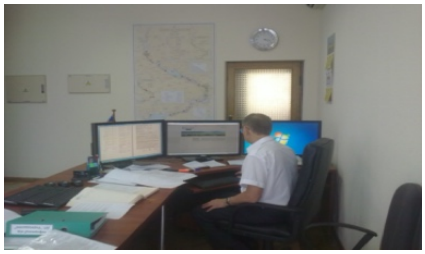

fig.4 RIS operators working place in UkrRIS

The inland navigation sector includes many parties such as national authorities, port authorities, vessel owners, skippers, providers of nautical services, customs etc. Achieving the objectives of RIS very much depends on the (information) needs of the stakeholders and interactions between these parties across national and organisational boarders, hence, the RIS Guidelines will describe generic solutions. The implementation guidelines will not consider how stakeholders are organised, as this may vary in different regions, countries and organisations. The RIS Guidelines focus on general recommendations for implementation of RIS taking in account international and national agreements and regulations.

The following categories of stakeholders can be differentiated:

• Services consumers – RIS users - in inland navigation operations

Examples of this user group are; skippers, ship owners, lock operators, VTS operators, terminal operators and port operators, etc

• Authorities

Examples of this stakeholder group are technical certification authorities, competent authority for traffic management, port authorities etc.

• Managers in inland navigation

Examples of this stakeholder group are fleet managers, waterway managers and water manager.

• Information providers

Fairway authorities (fairway surveillance, VTS operators, lock operators, ...)

• Service providers

Examples of this stakeholder group are RIS providers and rescue and emergency service providers (fig.5).

Using the Tactical Traffic Image in navigation mode requires that:

• The integrated display – inland ENC-viewer integrated with radar and AIS - is in accordance with the requirements for the navigation mode of the Inland ECDIS standard.

• The vessel's position is to be derived from a radar of which accuracy is consistent with the requirements of safe navigation.

• At least the safety relevant infrastructural objects should be included into the ENC. The competent authority should verify the safety relevant information in the

ENC (fig.6).

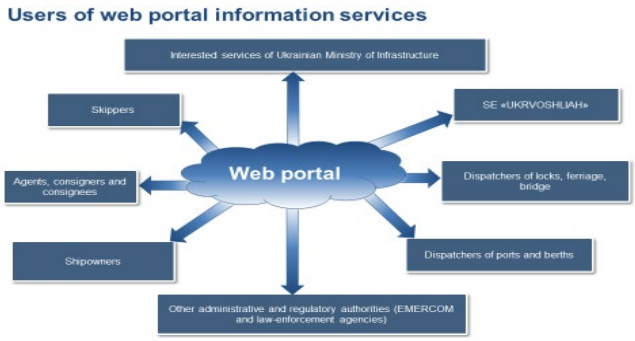

fig.5 web portal for RIS stakeholders

Fig.6 Automatic water level gauges in UA part of Danube

Calamity Abatement Support (CAS) is the information service that facilitate the supporting actions necessary to limit the consequences of a calamity (or accidents and incidents)(fig.7).

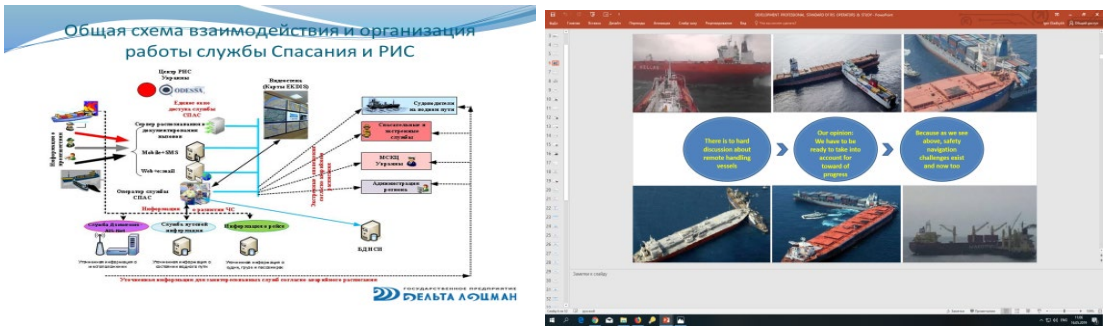

Fig.7 RIS Rescue center in UA

Each function in the table provides a function number, the function number is related to the primary operational services. As an example: FIS 2 – provide meteorological information - has a primary relation to Fairway Information Services but is also a function in Traffic Information Services and Calamity Abatement Services (fig.7).

A VTS should be planned, implemented and operated in accordance with the Inland VTS Guidelines of IALA and the CCNR guidelines on inland VTS.

RIS does not necessarily have to include a VTS.

The Tactical Traffic Image (TTI) to be used in an inland VTS is produced by combining shore based radar and AIS information and displaying the vessels and traffic information on an ENC.

AIS will enhance tactical and strategic traffic information in a VTS area and as such the VTS capabilities. AIS provides more vessel related information and improves an possible impact of an accident to restrict the possible negative consequences of an accident.(fig.8)

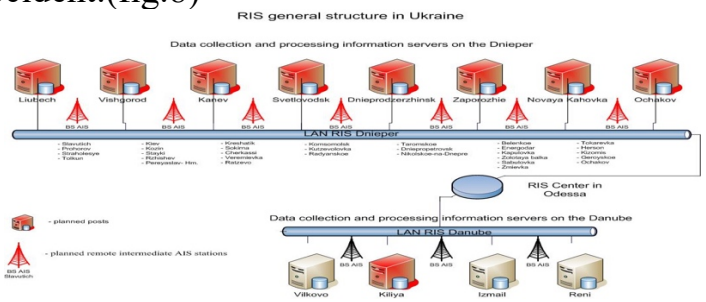

Fig.8 RIS general Structure in UA

A special group of reference data is covered by the RIS index. Inland ECDIS and Notices to Skippers in Europe require unambiguous coding of locations of geographic objects. The use of the RIS index/ISRS location code for geographic objects in Notices to Skippers and ECDIS facilitates the integration of Notices to Skippers in Inland ECDIS.

This is however also relevant for Electronic reporting and tracking and tracing activities.

A location code is the machine-readable link between Electronic Reporting, Inland ECDIS and Notices to Skippers. The location code is a unique ID for each piece of infrastructure, which is of importance for RIS.

The location code used in the RIS environment is a 20-digit alpha-numerical code – the ISRS location code - which consists of the following data elements: (fig.9, fig.10)

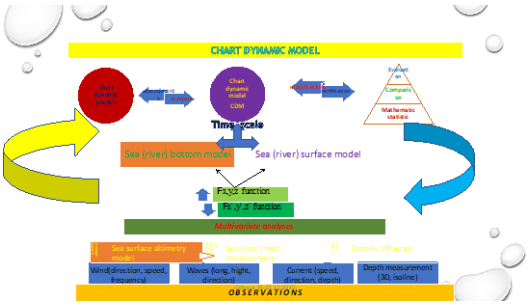

Fig.9 Dynamic model of river bottom

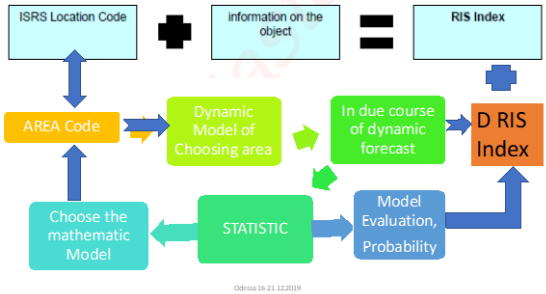

fig.10 solving the different tasks via RIS Index

The definition of RIS Enabled Corridor Management is:

"Corridor Management is defined as information services among fairway authorities mutually and with waterway users and related logistic partners in order to optimise use of inland navigation corridors within a network of waterways"

Below you can see Corridor Management of new planning area E-40 including RIS center in UA.

Fig.11 EU shipping way to planning E-40

SUMMURY

The successful delivery of RIS depends upon competent and experienced personnel to fulfil the responsibilities of a RIS authority. The recruitment, selection and training of suitable personnel are a pre-requisite to the provision of professionally qualified personnel capable of contributing to safe and efficient vessel operations. Such personnel will help to ensure that full regard is given to the diverse tasks inherent in RIS activities.

Training will depend on the RIS operational services that the organisation wants to implement, the existing organisation (is it starting with a green field situation or will RIS be integrated in already existing situation like a VTS centre), is there already trained VTS personnel, are there operational procedures in the organisation.

Taking into account the current circumstances, we offer remote simulation of RIS operators who will be able not only to remotely control/handling vessels on IWW, but also to solve the problems of ensuring the safety and efficiency of the voyage.

References

1. International Navigation Association Inland Navigation Committee (InCom) Permanent Working Group 125 **GUIDELINES AND RECOMMENDATIONS FORRIVER INFORMATION SERVICES edition 4 ..... 2018, Geneva,** UN ECE, 2019, 54 p

Анотация. *Речные информационные службы - это концепция информационных служб во внутреннем судоходстве для поддержки управления движением и транспортом во внутреннем судоходстве, включая взаимодействие с другими видами транспорта. Потенциал РИС для улучшения положения внутреннего судоходства в транспортной цепочке был также признан международными организациями, такими как Европейская экономическая комиссия Организации Объединенных Наций (ЕЭК ООН), несколькими речными комиссиями, такими как комиссии по Рейну и Дунаю и PIANC, Всемирная ассоциация Инфраструктура водного транспорта. Учитывая, что РИС в Европе развернуты на всех основных внутренних водных путях, возникла необходимость в подготовке специалистов для операторов РИС. В статье предлагается новый метод обучения с использованием комплексного подхода на базе Интернет-платформы в виде игры одновременно с несколькими участниками, находящимися на расстоянии друг от друга.*

Ключевые слова: *Речные информационные службы, подготовка специалистов операторов для РИС, Дунай*

Статья отправлена: 06.02.2021 г.