# Waterway Agenda Information System
## *Agenda informacijski sustav za plovne putove*

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## Summary

**Informatisation of the public administration of the Slovak Republic aims to create a functional architecture of the integrated information system. This system also includes the development of Agenda information systems that provide electronic services in the most automated mode, according to the principle all at once. In the field of water transport, there is currently no fully functional agenda information system. Creating an Agenda Information System (AIS) will allow multi-channel electronic access to public transport services in water transport. The complex information solution of the water transport agenda will be digitalized for individual applications and submissions. Part of the Waterway Agenda Information System will also be the establishment of a client zone, an online tool that will provide online information for users and providers. This tool will allow personalized client notifications that simplify the process for all parties involved (public administration, entrepreneurs, or individuals).**

## *Sažetak*

*Informatizacija javne uprave Republike Slovačke ima za cilj stvaranje funkcionalne arhitekture integriranog informacijskog sustava. Ovaj sustav također uključuje razvoj Agenda informacijskih sustava, koji pružaju najautomatiziranije elektroničke usluge prema načelu: sve odjednom. Na području vodnog prometa trenutačno ne postoji potpuno funkcionalan Agenda informacijski sustav. Pokretanje Agenda informacijskog sustava (AIS) omogućit će višekanalni elektronički pristup uslugama javnog prijevoza u vodenom prometu. Složeno informacijsko rješenje za vodeni promet bit će digitalizirano za pojedinačne zahtjeve i prijave. Dio Agenda informacijskog sustava za plovne putove također će biti uspostava zone klijenta, internetskog alata koji će korisnicima i pružateljima usluga pružati mrežne informacije. Ovaj alat omogućit će personalizirane obavijesti klijentima, koje pojednostavljuju postupak za sve uključene strane (javna uprava, poduzetnici ili pojedinci).*

## 1. INTRODUCTION / *Uvod*

The National Concept of Informatisation of Public Administration of the Slovak Republic aims to create a functional architecture of an integrated information system. Informatisation of public administration will remove multiple requests for information, documents and data from individuals and entrepreneurs. The national concept of informatisation of public administration brings a new systematic and coordinated approach to the solution of the issue of informatisation of public administration, in particular by focusing not only on the central architecture and central components of the architecture of the integrated public administration information system, but also solves in more detail the issue of informatisation of solutions of individual components (e.g. agendas information systems). It defines central rules so that public administrations provide quality services not only to citizens and entrepreneurs, but also to other public authorities. [1, 2]

The information system operating in this way is the basis for building agendas information management systems (so-called subsystems) of individual components of public administration. At present, there is no fully functional information system in the field of water transport, which enables two-way electronic

communication between citizens, entrepreneurs and public administrations. [3, 4]

In the field of water transport, only the procedures that need to be implemented in individual operations are defined when dealing with the agenda for individual and legal entities. In the complex information solution of the water transport agenda (issuing certificates of small and large vessels, professional qualifications, establishing vessel rentals, information on waterways, navigation safety, etc.), the paper form of individual submissions would be replaced. This will lead to a reduction in the time for handling submissions as well as simplification and clarification of the whole administrative process. [5, 6]

An integral part of the Waterway Agenda Information System will be the establishment of a client zone. It will be an online tool that will provide online information to users and providers (current status of submitted applications, exam dates, as well as current navigation measures, navigability information, navigation restriction, etc.). Such a tool will allow, for example, to personalize client notifications, which will simplify the process for all parties involved (public administration, entrepreneurs or individuals). [7, 8, 9]

## 2. ARCHITECTURE OF WATERWAY AGENDA INFORMATION SYSTEM / *Arhitektura Agenda informacijskog sustava za plovne putove*

When designing the functional architecture of the Agenda Waterway Information System, it is necessary to define the following application features of agendas: [10]

- Access components that provide multi-channel access to public waterway services with availability at any time and location.
- Filing components that will provide multi-level interactive electronic forms to implement the electronic filing of the requested service (e.g. filing an application for a small vessel's licence, a duplicate license request, etc.). As part of the procedural steps before submission, the online payment process will be mediated to the applicant depending on the type of service. Within the client zone, it will be possible to monitor the progress of the procedure for generated service submissions.
- Identification and authentication to provide identification and authentication mechanisms for all services provided to applicants.
- Authorization that covers authorization and verification mechanisms for end applicants and providers for all types of electronic signatures in relevant standards.
- Payment clearance, which provides a synchronous process of making a payment for filing processes (immediate-release statement / depreciation services and price list) as well as asynchronous payment execution process for public administration agenda processing (solutions), including issuance of support services for order creation payment.
- Delivery and notification components that deliver electronic submissions, electronic official documents, notifications, crisis notifications to final service applicants as well as applicants' access to a central official electronic board.
- Sharing and participation that will allow sharing of information with individual and legal entities as well as their active participation in water transport issues.
- A client zone that will allow unified access to all tools that the waterway administrator / client needs to operate.
- A client zone that allows the user to access his agenda, current submissions, manage notifications (alerts), and so on.

The Agenda Information System will operate on the basis of an information platform whose comprehensive form will include an interface to the primary source of information provided by the integrated public administration information system as well as other secondary information systems (Associated IS). In Figure 1, the basic architecture of AIS modules are proposed. The modules are based on the general agenda of the Ministry of Transport and Construction of the Slovak Republic and the Transport Authority – Inland Waterways Division. The "Vessels" module addresses the agenda for completing all formalities related to large and small vessels and their construction. The "Navigational safety" module concerns information on navigational measures on open and closed inland waterways. The module "Waterways" addresses the issue of the possibility of navigation of small vessels, the conditions for the establishment of rental vessels, permitting the state of floating facilities, activities on the waterway and all information related to the inland ports of the Slovak Republic. The "Competency" module has an agenda related to the acquisition of professional qualifications of ship's crew members and licenses of small vessel. The "RIS" module draws on the already functioning RIS (River Information Services) in Slovakia under the administration of the Transport Authority of the Slovak Republic and its aim is to transmit data on navigation, safety or other important information related to navigation in a user-friendly form. [11]
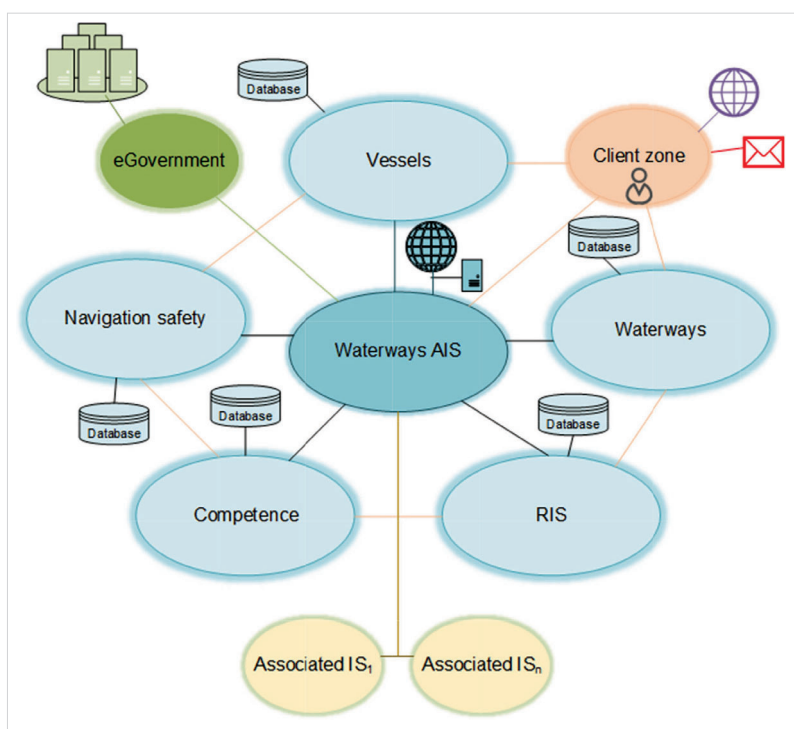


Figure 1 Basic architecture of the Waterway Agenda Information System – modular
*Slika 1. Osnovna arhitektura Agenda informacijskog sustava za plovne putove – modularna*
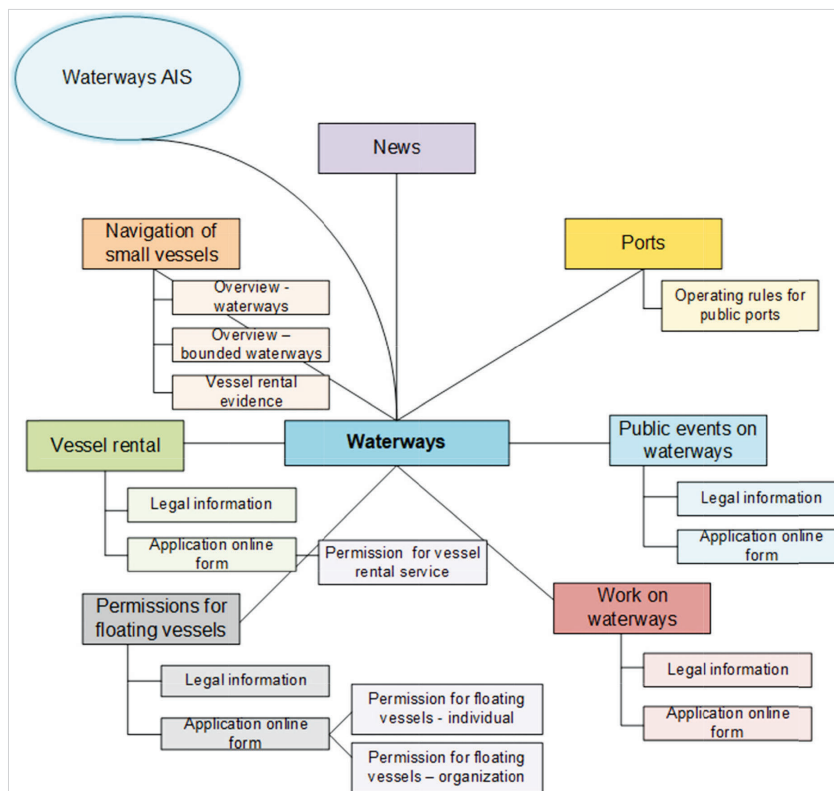
Source: Author

Figure 2 Example of structure and content of the selected module (Waterways)
*Slika 2. Primjer strukture i sadržaja odabranog modula (plovni putovi)*

Source: Author

In Figure 2 is the concept of one of the 5 basic proposed modules. The picture shows the basic agenda within this module. All waterway information is available in this module. The module consists of information concerning small vessels, their registration or evidence, information on the possibilities of organizing public events on waterways, work on waterways or information needed to set up a vessel rental company. Part of each agenda within this module is also the possibility of online submission of relevant applications and monitoring of their status in their client zone.

### 2.1. Client Zone / *Zona klijenta*

The client zone of the Waterway Agenda Information System (Figure 3) provides online information for users and providers (actual status of submitted applications, dates of examinations, as well as current navigation measures, information on navigability, stoppage of navigation, etc.). [12] Such a tool will allow, for example, to personalize client notifications, which will simplify the process for all involved (public administration, entrepreneurs or individuals). In the client zone, each subject has at its disposal all information about its activities, submitted applications, the status of their submissions, or other important information concerning its agenda. In addition, it is possible to create alerts according to specified specifications and redirect their notification to other information-communication applications (email, social networks, etc.). [10]

### 2.2. Electronic Forms / *Elektronički obrasci*

Electronic forms are created in accordance with other revenue requirements - the Electronic Forms Standard, ensuring compliance, in particular, with data standards and file usage standards. For all parts of the electronic form, there is a complete documentation, published with the appropriate electronic form. These parts of the electronic form and their published documentation meet the requirements for openness and technological neutrality under Section 6 (1) of the Act. [10,11]

The electronic form user interface provides the following features for the user of the electronic form:

- Completion and presentation of completed electronic form data.
- Storing the data in the designated data store at any time of filling in and reloading the data from the designated data store to the electronic form.
- Printing out the completed electronic form.

An electronic form user interface can be used to sign a completed electronic form. The electronic form must be created correctly and in accordance with the law.

The electronic form completion rules set the mandatory and permitted ranges of data field values, determine control, filtering, and other user functions, and provide guidance and aids for users to correctly fill out electronic forms. Rules for completing an electronic form do not include procedural rules for further processing of the electronic form, such as filing, signing, although they may include guidance on these features.

All electronic forms in the Waterway Agenda Information System must be able to be filled in manually (filling in by an individual), online with an active internet connection or off-line without an active internet connection. The manual fill method can also provide automated pre-fill to facilitate the use of the electronic form. Forms are the basis of the entire agenda system. Through them, it will be possible to simplify the process of submitting individual applications. Electronic forms will be pre-filled for each specific agenda and will create
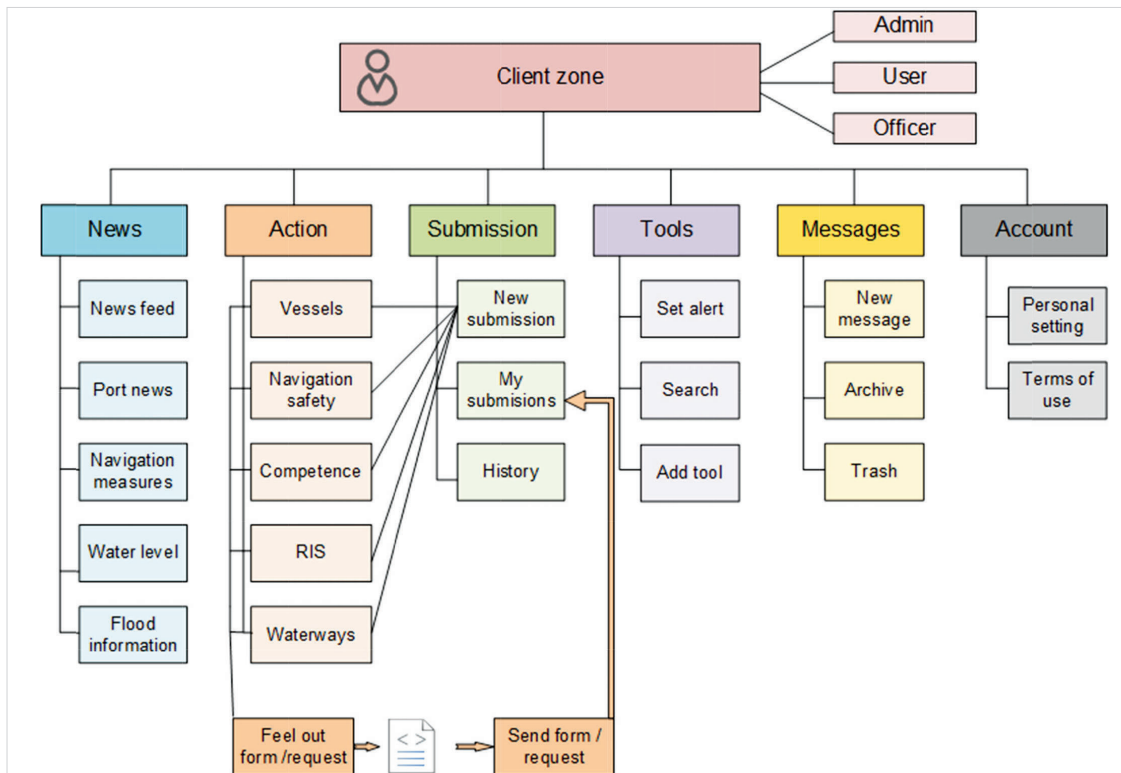
Figure 3 Basic client zone interface design
*Slika 3. Osnovni dizajn sučelja zone klijenta*

Source: Author

a communication basis between entities in water transport and the state administration.

For the on-line manual fill method, a user interface is provided for filling in an electronic form in HTML format by the World Wide Web Consortium (W3C) or XHTML by the World Wide Web Consortium (W3C), which can also be provided for offline manual mode. [10,11]

In particular, each electronic form is provided in a form that allows online manual filling, directly through a web browser without the need for special applications.



Figure 4 Example of online form of the AIS
*Slika 4. Primjer internetskog obrasca AIS-a*

Source: Author

## 3. CONNECTION TO AN INTEGRATED PUBLIC ADMINISTRATION IS (IPAIS) / *Povezanost s integriranim informacijskim sustavom javne uprave (IPAIS)*

The IPAIS reference architecture suggests that any ISVS can be linked to other eGovernment systems using the FE integration or data integration platform.

Whether it is an agenda or internal (shared or specialized) public administration information system (PAIS), it is necessary to solve:

- Authentication by joining a specific identity and access management system (IAMS) module (different IAMS modules can handle citizens signing up and signing in).
- Providing information on the possible use of personal data (due to GDPR) in the data integration platform, from where it further processes and communicates with the citizen the "My Data" module. My data represents the layer within the IPAIS.
- Provision, or use of data (reference or open data, analytical data processing) by joining a data integration platform. This includes responding to emerging and promoted events in other PAIS (for example, by providing proactive services for PAIS agendas) and promoting your own events (to which other PAIS and will respond).

Furthermore, the following needs to be addressed for the Waterway Agenda Information System:

- Authorization of shares and documents (signing).
- Connection to a shared electronic registry module when used.
- Publishing (and documenting) all important services (especially business logic services) through the GW Web API, from where they can be used by any "contact point" (in terms of a point of service in a multi-channel environment). Subsequently, it is necessary to bring the relevant subset of services into the OpenAPI environment.

In addition, for Agenda systems, you need to solve:

- Connection to electronic delivery and electronic forms module.
- Bringing selected services from the Web API GW to the process orchestra module where they are involved in complex orchestrated services. Processes can be extensive and in the task of their automation it is necessary to carefully consider and think about which processes it makes sense to automate (and subsequently also orchestrate = interconnect and specially to harmonize overall).
- Connecting to other common front-end (FE) modules (state messenger / chat box etc.). [10,11]

## 4. AUTHENTICATION AND AUTHORIZATION IN eGOVERNMENT / *Provjera valjanosti i autorizacija u eupravi*

Authorization and authentication are based on the architecture of the IPAIS system. Proposed waterway agenda information system will be created on a platform that will be compatible with the eGovernment system. Waterway agenda information system is a subsystem of the IPAIS system. Work with identities within the agenda system must comply with the rules for granting identities within IPAIS.

In addressing authentication and authorization (actions, documents), two distinct elements need to be identified:

- Identity and access management system (IAMS module - part of a set of common FE modules). Within it, topics not tied to a specific authentication method are typically solved (for example, using an eID card). The system is used by all sub-systems, connecting to an identity store (database), connecting to various authentication methods, and so on. Especially in this section it is important to note that the typical IAMS within the "authorization" also cover the topic of central administration and allocation of "application privileges".
- A set of authentication methods (using an eID card, using a smartphone, using biometrics (e.g. face), etc.). Verification in the event of "authorization" of an action or document is performed in the background by means of a sufficiently trustworthy connection of granting authorization (authorization) to the document or action / transaction. Different services may require either a lower (electronic signature) or a higher (qualified electronic signature) security level.
- User credentials (for transactions, actions, documents) are handled centrally in the IPAIS environment (see following figure) within the common FE modules. [10,11]
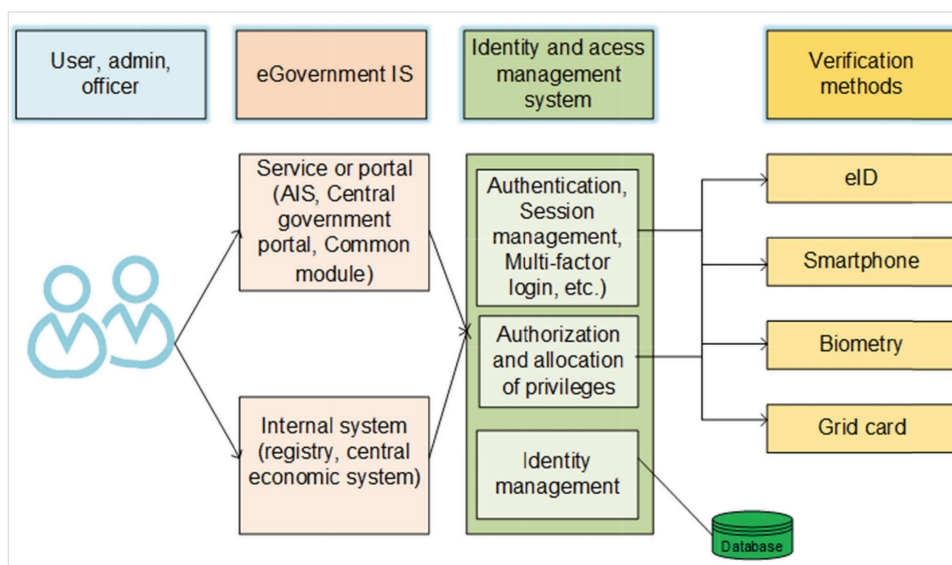


Figure 5 Authentication and authorization (actions, documents) in eGovernment
*Slika 5. Provjera valjanosti i autorizacija (postupci, dokumenti) u e-upravi*

Source: Author, [11]

Authentication or authorization verification methods for public administrators may be similar (or even shared) as in the case of signing up of individuals and entrepreneurs or adding specific (electronic "grid" cards). Work with identities within the agenda system must comply with the rules for granting identities within IPAIS.

## 3. CONCLUSION / *Zaključak*

The main objective of the paper is to design the architecture of the Waterway Agenda Information System, which will provide multi-channel electronic access to public waterway services. In a comprehensive information solution for the waterway transport agenda (issuing vessel certificates, proficiency certificates, waterway information, navigational safety, etc.), the paper form of individual submissions will be replaced, which will reduce the time for processing, simplification and transparency the whole administrative process. The Waterway Agenda Information System will also include the establishment of a client zone, an online tool that will provide online information for users and providers (current status of applications submitted, dates of examinations, as well as current navigation measures and information). Such a tool will make it possible to personalize client notifications, which will simplify the process for all involved (public administration, entrepreneurs or individuals). An integral part of the project is the connection of the Waterway AIS with the public administration portal or other associated information systems. This system is designed based on specific conditions in Slovakia, but its concept can be applied in other countries with appropriate adaptation to the specific conditions. The system will simplify communication between public authorities, shipping companies, port operators and with all users of water transport services. The elaboration of a follow-up feasibility study based on such a concept will be a practical model applicable in other countries. This study brings several areas that are currently unique, especially in the field of informatization of water transport. Currently, weak information security on the main water corridors is striving for significant improvements in this area. An example is the effort to introduce river information corridor services.

## REFERENCES / *Literatura*

[1] Mondragon, AEC., Lalwani, CS., Mondragon, ESC, Mondragon, CEC., Pawar, KS. 2012. Intelligent transport systems in multimodal logistics: A case of role and contribution through wireless vehicular networks in a seaport. 14th International Symposium on Logistics of Global Supply Chains and Inter-Firm Networks. Istanbul. Turkey. 165-175. https://doi.org/10.1016/j.ijpe.2011.11.006

[2] Stopka, O., Kampf, R., Kolar, J., Kubasakova, I. 2014. Identification of Appropriate Methods for Allocation Tasks of Logistics Objects in a Certain Area. In: *Naše more*. Dubrovnik: University of Dubrovnik. Vol. 61, No. 1-2, 1-6. ISSN 0469-6255.

[3] Binova, H., Jurkovic, M. 2015. Methodology of inland ports design as intermodal terminals in the Czech Republic. In: *Carpathian Logistics Congress (CLC 2015.) – Conference proceedings*. Jesenik, Czech Republic. NOV 04-06. 126-131.

[4] Cisko, S., Kliestik, T. 2006. Application of graph theory in intelligent transportation system. Business development possibilities in the new European area: international conference: scientific proceedings. Vilnius, Lithuana. 63-68.

[5] Stopka, O., Gasparik, J., Simkova, I. 2015. The Methodology of the Customers' Operation from the Seaport Applying the „Simple Shuttle Problem". In: *Naše more*, Dubrovnik: University of Dubrovnik. Vol. 62, No. 4. 283-286. ISSN 0469-6255. doi: 10.17818/NM/2015/4.7. https://doi.org/10.17818/nm/2015/4.7

[6] Klepoch, J., Zarnay, P. 1998. The advance trends of „river – sea" transport Technologies enforcement in long distance traverse. In*: Communications on the edge of the millenniums: 10th international scientific conference. 5th section, Quality and efficiency of transport, postal and telecommunications services. Zilina*. University of Žilina. ISBN 80-7100-520-7. 203-206.

[7] Dvorak, Z., Leitner, B. & Novak, L. 2011. National Transport Information System in Slovakia as a Tool for Security Enhancing of Critical Accident Locations. Kaunas, Lithuania, Kaunas University of Technology. 145-148. ISSN 1822-296X.

[8] Hraskova, D., Bielikova, A., Rypakova, M. 2014. The Possibilities for Application of Telework in Water Transport. In: *Naše more, znanstveno-stručni časopis za more i pomorstvo*. Vol. 61, 3-4. 60-66. ISSN 0469-6255.

[9] Jurkovic, M., Kalina, T., Turcan, R., Gardlo, B. 2017. Proposal of an enhanced safety system on board of the inland vessel. In: *MATEC web of conferences. LOGI 2017. – 18th international scientific conference*. Ceske Budejovice, Czech Republic. October 19, 2017. ISSN 2261-236X. – Vol. 134, art. no. 00022. 7. https://doi.org/10.1051/matecconf/201713400022

[10] Reference Architecture of the Integrated Public Administration Information System. Bratislava. 2017.

[11] Reference Architecture of Public Administration Information System in Cloud. Bratislava. 2017.

[12] Dávid, A., Slesinger, J., Jurkovic, M., Hargitai, C., Gyorgy, D., Simongati, G. 2014. Danube Navigation Requirements and Concept. Zilina, Budapest.