



Interreg



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**Integrating Danube Region into Smart & Sustainable Multi-modal
& Intermodal Transport Chains**

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Contributing Authors

Name	Organisation	Email
Ruxandra Florescu	PDM	florescu@prodanube.eu
Róbert Rafael	PDM	rafael@prodanube.eu
Christian Stark	PDM	stark@prodanube.eu
Karin Voglsam, Werner Auer	EHOÖ	k.voglsam@ennshafen.at; w.auer@ennshafen.at
Monika Thury, Bela Szalma	HFIP	popeiproject@gmail.com; elnok@hfip.hu
PP experts (assigned Communication experts)	All DIONYSUS partners	

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2 Abbreviations

Abbreviation	Explanation
CEF	Connecting Europe Facility
DINA	Digital Inland Navigation Area
DPN	Danube Ports Network
DTLF	Digital Transport & Logistics Forum
eIDAS	National electronic identification schemes (eIDAS Regulation ensures that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where eIDs are available)
EC	European Commission
EU	European Union
GDPR	General Data Protection Regulation (Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data)
IWT	Inland Waterway Transport
RIS	River Information Services

3 Introduction

Being the first of a series of 3 Yearly Activity Reports, the aim of this document is to discuss and identify digitalisation initiatives along the logistics chains in line with RIS deployments and to present EU digitalisation goals that have a direct impact on the development of IWT. This report covers the first six months (Period 1) of the DIONYSUS project and provides, as such, a **non-exhaustive** list of relevant digitalisation initiatives and projects.

The first part of the report discusses the current status of digitalisation of IWT in Europe, with an eye on the most important legislation governing it, arguing that digitalisation is of utmost importance in significantly reducing the overall administrative burden. It decisively contributes to a smooth transport flow and to a reduction of transport costs, making IWT for emerging markets and/or new business entries more attractive.

The final chapter of this report discusses a know-how promotion e-tool – the **Digital Initiatives Observatory** – which will be made available via the DPN website (www.danubeports.eu). The aim of the Digital Initiatives Observatory is to provide an interactive tool, a web search engine, that collects information on various relevant aspects of digitalisation in IWT. Some of the main defined categories include filters set by country, dedicated working groups (such as DTLF), funding opportunities, relevant projects and last, but not least, policy initiatives defined at the EU level.

This report furthermore provides, based on extensive desk research activities, a **non-exhaustive** list of successful digitalisation projects and initiatives. The collected information will feed into the Digital Initiatives Observatory and are not limited to the Danube Region.

In order to provide concise information on current digitalisation efforts in IWT at the European level, the investigation period was set in accordance with the lifecycle of the DIONYSUS project. Hence, only those projects are taken into consideration which are ongoing during the lifespan of the project. These projects are regarded as the pillars of the ongoing digitalisation efforts in IWT at the European level. They correspond to the requirements set by the European Legislator, adhering to the highest possible standards and can, as such, be regarded as examples of good practices.

2 Overview on the current status of digitalisation in IWT

This chapter provides an overview on the current status of digitalisation in IWT in Europe, addressing issues such as legislation, initiatives and specific challenges. The findings partly rely on the research activities concluded in the framework of the GRENDEL project.

Digitalisation is indispensable for the future of IWT, for its efficient and enduring integration in the transnational transport and logistics system as well as for its degree of competitiveness. It represents a viable solution to considerably reduce administrative costs and to make a more systematic use of the existing resources of IWT infrastructure. Furthermore, digitalisation facilitates the expansion of new businesses, making IWT a more attractive mode of transport. The main aspects of digitalisation in IWT are the following:

2.1 River Information Services (RIS)

River Information Services (RIS) are modern traffic management systems enhancing a swift electronic data transfer between water and shore through in-advance and real-time exchange of information. These services are designed to enhance safety and efficiency of IWT by optimising traffic and transport processes. Focal aspect is a swift demand oriented electronic data transfer between water and shore through a real-time exchange of information. As such, RIS aims to streamline the exchange of information between IWT stakeholders. The 2005 adopted **RIS Directive** provides minimum requirements for the implementation of RIS and its agreed standards in order to enable the cross-border compatibility of national systems, functioning as the main pillar of digitalisation in IWT. The following figure represents a general overview of the current status of RIS and its functionalities.

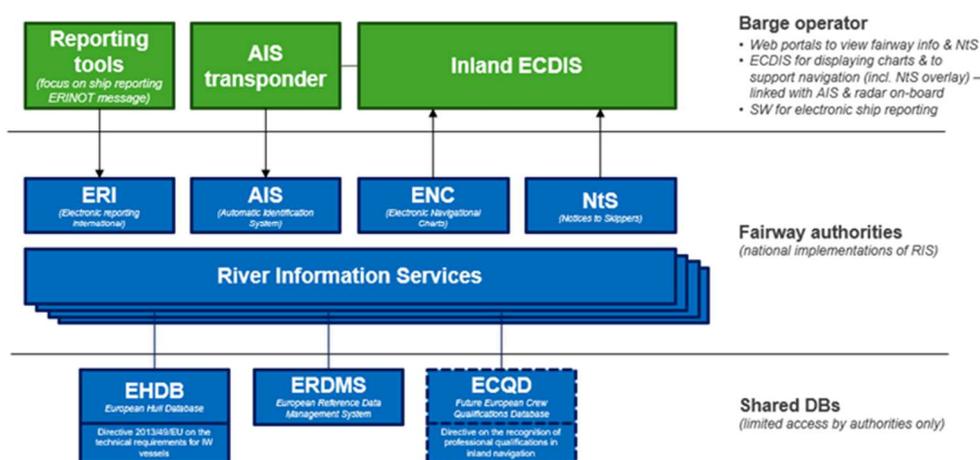


Figure 1: RIS overview

2.2 Digital Inland Waterway Area (DINA)

The “**Digital Inland Waterway Area - Towards a Digital Inland Waterway Area and Digital Multimodal Nodes**” study was finalised in October 2017. The study helps to frame the discussion on the digitalisation of the inland waterways transport sector. DINA is a concept which aims to interconnect information on infrastructure, people, operations, fleet and cargo in the inland waterway transport sector and to connect this information with other transport modes. DINA identified three areas where digitalisation is critically important for IWT:

1. The improvement of navigation and management of traffic: this is necessary to make more efficient use of the capacity of the infrastructure and to reduce fuel costs for vessel operators.
2. The integration with other modes of transport, especially in multimodal hubs: this is necessary to optimise processes in terminals and to allow for improved integration of IWT in supply chains and multi-modal logistics operations, thereby potentially attracting additional customers.
3. A reduction of the administrative burden: reducing the number of business-to-government declarations (thereby saving costs & improving efficiency) and making law-enforcement more efficient and effective.

The following figure provides an overview on the involved actors in the digitalisation process of IWT:

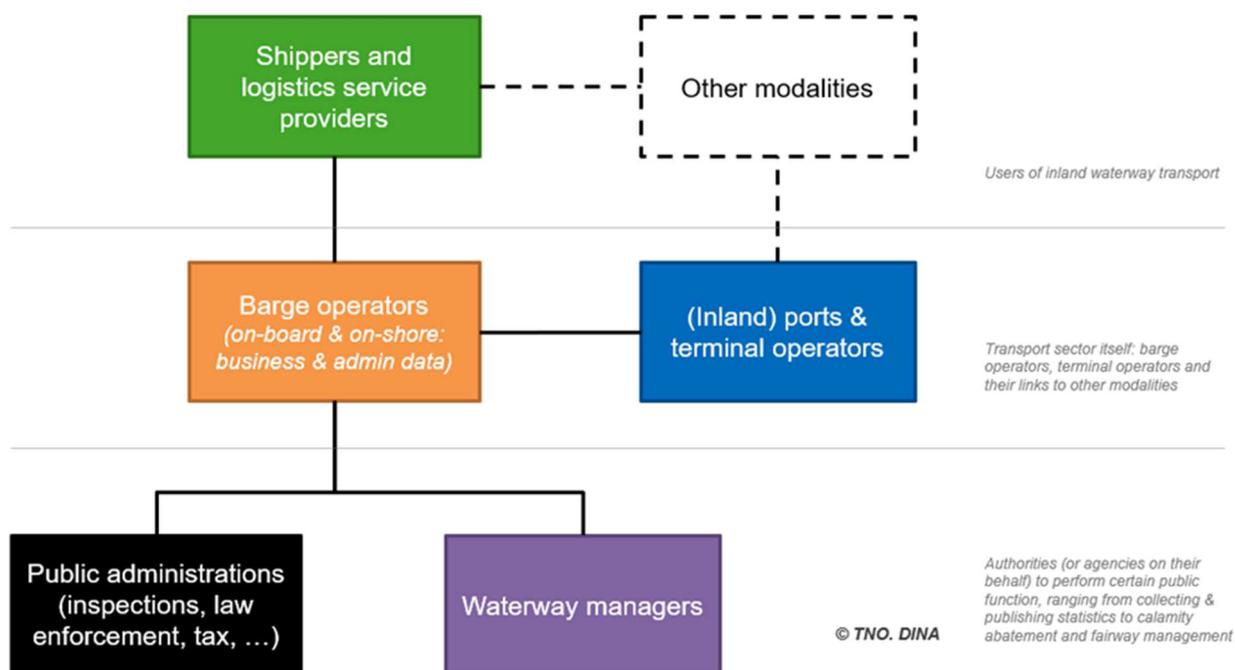


Figure 2: Overview of the actors involved in the digitalisation of IWT.

The following figures provide a precise overview on the proposed controlled sharing of information which can serve as a platform for future developments:

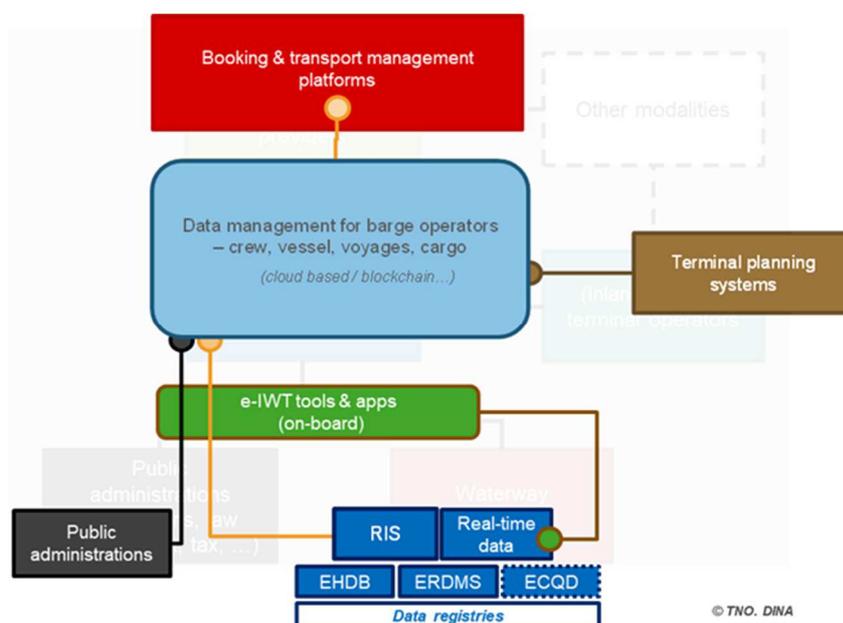


Figure 3: DINA architecture for data sharing (1)

Based on this, the following future developments are expected to facilitate the further development of digitalisation in IWT:

- An **extension of RIS**: providing additional (real-time) data between infrastructure managers and barge operators, making it more interoperable and useable for barge operators using new on-board e-IWT tools and applications.
- **Data platform(s) for barge operators**: allowing them to control their own data and operations. This should allow barge operators to share data in a controlled way with other stakeholders such as public authorities (for reporting purposes), (inland) ports and terminals.
- **Integration with booking and transport management platforms** of shippers and logistics service providers. This should provide better visibility and better integration of IWT in the full logistics chain covering multiple modalities.

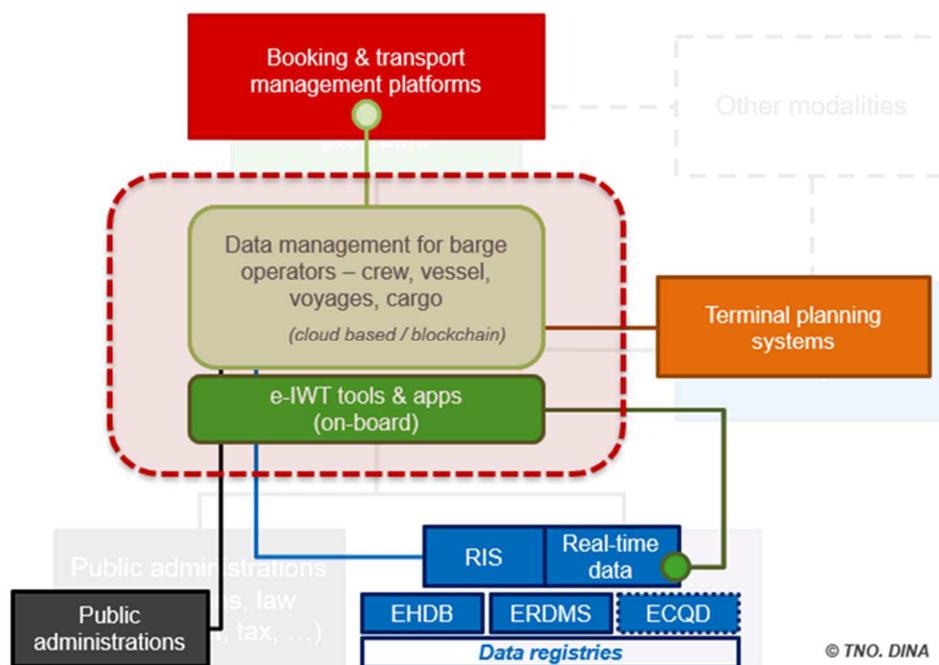


Figure 4: DINA architecture (2)

- **A data platform for barge operators:** allowing them to control their own data and operations. This should allow barge operators to share data in a controlled way with other stakeholders such as public authorities (for reporting purposes), (inland) ports and terminals.

2.3 CEF Building Blocks

The CEF Building Blocks are tools consisting of **eID**, **eSignature**, **eDelivery**, **eInvoice** and **eTranslation** which aim to ensure interoperability between IT systems and to facilitate the delivery of digital public services across borders, while the relevant rules and regulations (the eIDAS Regulation and the GDPR being in this regard the most important aspects) are fully complied with.

The **eIDAS Regulation** is cross-border and cross-sectoral legislation which provides a clear regulatory environment to enable secure and seamless electronic interactions between businesses, citizens and public authorities. eIDAS Regulation provides legal certainty for electronic identification and trust services going beyond national borders. More specifically, the Regulation ensures that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where eIDs are available.

The **GDPR** is the primary legislation regulating how companies protect the personal data of EU citizen. Its requirements apply to each member state of the EU, aiming to create more consistent protection of consumer and personal data across EU nations. Some of the key privacy and data protection requirements include:

- Requiring the consent of subjects for data processing;
- Anonymizing collected data to protect privacy;
- Safely handling the transfer of data across borders.

2.4 Electronic Freight Transport Information

Knowing that the movement of goods is accompanied by a large number of information which is still exchanged in paper format among businesses and authorities, the Regulation sets the legal framework for the electronic communication between authorities and economic operators. Its core objective is to encourage the digitalization of freight transport and logistics in order to significantly reduce administrative costs and improve the efficiency and sustainability of transport. Essential characteristics of the Regulation stipulate the functional requirements applicable to eFTI platforms to enable the data exchange process among the involved actors, including requirements to third-party platform service providers. The following figure provides an overview of the key elements of the eFTI Regulation:

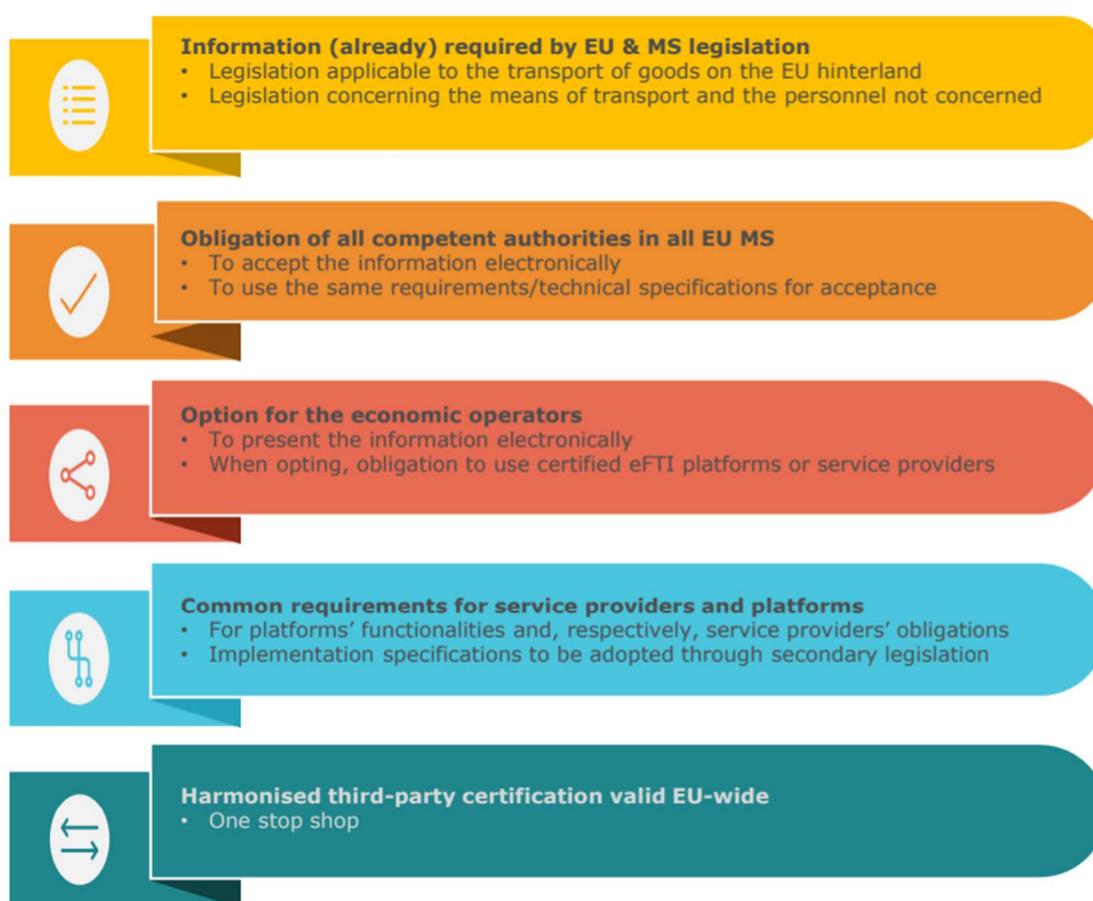


Figure 5: Key elements of eFTI. © EC

2.5 Digital Transport and Logistics Forum (DTLF)

The DTLF is a group of experts in the field of transport and logistics. It provides a platform where Member States and relevant transport and logistics stakeholders can exchange technical knowledge, cooperate and coordinate with a view to support measures aimed at promoting efficient electronic exchange of information in transport and logistics. Its task is to assist the Commission in developing and implementing policy measures. It identifies challenges and areas where common action in the EU is needed, provides recommendations, and supports the implementation of these recommendations where appropriate. The following figure provides an overview on the DTLF, its tasks and responsibilities:

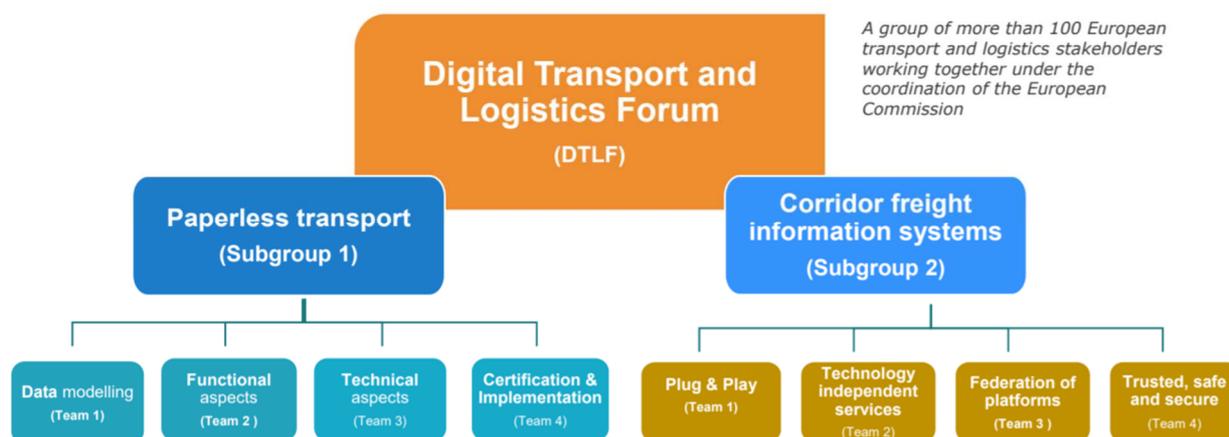


Figure 6: DTLF. © EC

3 Digital Initiatives Observatory

The Digital Initiatives Observatory consists of digitalisation initiatives along the logistics chains in line with RIS deployments, EU digitalisation policy goals, legislation and measures in relation to IWT.

The Observatory will consist of an interactive webpage which will be hosted on the DPN website and will be periodically updated (at least once a year).

The webpage is in such a way designed that it enables the visitor a fast and easy access to the most relevant information. By means of dedicated filters, the visitor will select the information which interest him/her the most, choosing between:

- Country,
- transnational projects,
- policy initiatives,
- dedicated working groups,
- funding opportunities.

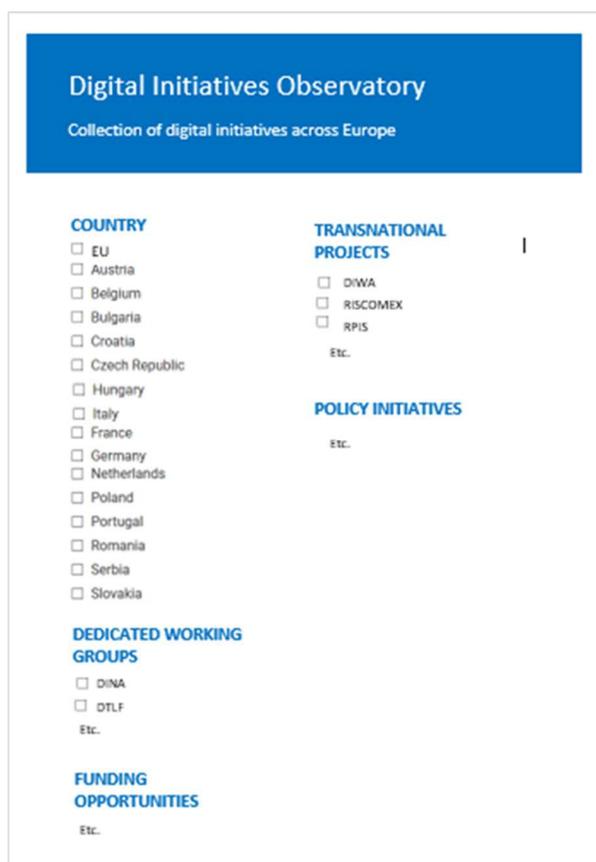


Figure 7: Concept of the Digital Initiatives Observatory

Based on this concept, the following transnational projects have been identified in the course of the first months of the lifespan of DIONYSUS. The following list of projects is a **non-exhaustive** one and will be continuously updated - both on the DPN website, section Digital Initiatives Observatory as well as in the framework of the upcoming Yearly Reports envisaged for 2021 and 2022.

3.1 List of projects

The following subchapters provide, based on extensive desk research activities, a comprehensive, however non-exhaustive list of various successful digitalisation projects and initiatives currently ongoing in Europe. In order to provide a wide range of examples of good practices, the collected data is not limited to the Danube Region.

Project name: **RIS Corridor Management Execution**

Abbreviation: **RIS Comex**

Funding programme: **CEF Transport**

Timeframe: **2016-2021**

Website: www.riscomex.eu

Focus: RIS COMEX is a CEF funded multi-Beneficiary project aiming at the definition, specification, implementation and sustainable operation of Corridor RIS Services following the results of the CoRISMa study. RIS COMEX started in the course of 2016 and was prolonged until the end of 2021.

The project area covers altogether 13 different European countries having 14 partners joined their forces under the coordination of the Austrian Waterway Administration viadonau with the common goal to realise Corridor RIS Services. Furthermore, Poland joined the project as cooperation Partner in the course of 2018.

The RIS COMEX project aims for implementation and operation of cross-border River Information Services based on operational exchange of RIS data. These RIS-based Corridor (information) services shall allow for traffic management by the authorities and transport management by the logistics sector. They make use of available national infrastructure and services.

The main objectives of RIS COMEX are:

- Development of an overall Corridor RIS Management concept (starting from CoRISMa results) in dialogue between RIS providers and logistics users (e.g. shippers, boat masters, vessel and fleet operators, terminal operators) to ensure the relevance of the implemented services.
- Implementation and permanent operation of selected parts of the overall concept providing increased quality and availability of Fairway-, Traffic- and Transport Information Services resulting especially in a considerable increase of efficiency within Inland navigation transports and also directly contributing to the utilisation of the general benefits provided by RIS, i.e. increase of safety, efficiency and environmental friendliness of inland navigation as transport mode.
- Defined and agreed operational arrangements (legal, organisational, financial, technical, quality) to ensure sustainable further development, implementation and operation of infrastructure and services for harmonised RIS enabled Corridor Management beyond the lifetime of the project.
- Harmonisation of data exchange concepts for RIS data through the cooperative development and specification of RIS enabled Corridor Services avoiding the rise of different data exchange concepts.
- Progress on harmonisation of transport information services on European and/or Corridor level based on existing solutions and concepts (e.g. IVS90, imagine, ERI agent, R2D2).

- RIS COMEX, as the platform bringing together public and private actors in RIS enabled corridor management, will facilitate the dialogue between providers of River Information Services and logistics users (e.g. shippers, vessel and fleet operators, terminal operators).
- RIS COMEX will develop harmonized River Information Services for inclusion in the DINA initiative and will bring RIS one step further to integration with other transport modes.

Based on these objectives the project aims specifically at:

- Better planning of inland waterway transports (increased reliability of transport times);
- Reduction of waiting and travel times;
- Increase of efficiency within the execution of inland navigation transports;
- Optimal use of infrastructure (increased utilisation of capacities);
- Reduction of administrative barriers.

Project name: **Synchromodal Traffic & Transport Information Services**

Abbreviation: **AIRIS-II SYNCHRO**

Funding programme: **CEF Transport**

Timeframe: **2019-2022**

Website: <http://oceano.uma.es/projectsdetail.php?projid=airis2&lang=eng#menu>

Focus: This Action is a part of a Global Project to increase the efficiency and capacity of the Guadalquivir river and the Port of Seville through the transformation of the port into a state-of-the-art logistic reference node by implementing new technologies, innovative technological and business driven systems.

The main objective of this Action is to demonstrate the feasibility of the development of innovative systems to increase the efficiency of the Port of Seville by favouring synchromodality of port operations.

The Action covers the following activities needed to develop the pilots and demonstrate the feasibility of the planned course of synchromodal development: River Information Services preliminary and detailed studies, pilots deployment, integration and validation as well as large-scale implementation study.

It is expected that the pilots will demonstrate that the following advantages can be gained further to the improvement of the efficiency of the operational procedures:

- decrease in operating costs of port users;
- improved transit time;
- reduction of waiting times.

Project name: **Masterplan Digitalisation of Inland Waterways**

Abbreviation: **DIWA**

Funding programme: **CEF Transport**

Timeframe: **2019-2022**

Website: www.masterplandiwa.eu

Focus: The objective of the Action is to develop the Masterplan Digitalisation of Inland Waterways that will be a joint, uniform and integral digitalisation strategy for IWT under the responsibility of the participating fairway authorities, ready for the execution in the period from 2022 until 2032. The Masterplan will consider the adaptation to the evolution of the policy and it will be based on (inter)national business developments related to the inland waterways traffic and transport domain, as well as on the game-changing technological developments of recent and coming years.

The Masterplan will consider the requirements put on this digital transition related to cybersecurity, standardisation, rules and regulations, security and privacy. A digital information infrastructure requires also more and more attention for the quality of data and information. The Masterplan will focus in this context on procedures and processes for quality management during implementation and operation of the digital waterway infrastructure. It will include a set of implementation scenarios covering technical, organisational, financial and operational consequences each Beneficiary will face in the digitalisation process.

These boundaries of the Masterplan will be related to the required (future) facilitation of internal and external stakeholders, business models in inland waterborne traffic, transport and logistics as well as operational and administrative processes.

It will have a sound basis in the RIS developments and national and European implementation projects, since it will be based on the implementation status of RIS and will build on the results of the recent RIS enabled Corridor Management projects CoRISMa (TEN-T project No 2012-EU-70004-S – RIS Enabled European IWT Corridor Management) and COMEX (CEF Action No 2015-EU-TM-0038-W – River Information Services Corridor Management Execution). It is also expected that it will become a basis for digitalisation of inland waterways transport for other fairway authorities. Involvement of other fairway authorities in the implementation of the Action through the Reference Groups will create awareness of the Masterplan and facilitate the dissemination of results.

Project name: **Integrated Port Information System in Hungary**

Funding programme: **CEF Transport**

Timeframe: **09/2017-12/2022**

Focus: the competitiveness of Hungarian inland ports suffers from obsolete infrastructure and outdated technologies. The overall objective of the Action is to develop an integrated inland port ICT application to streamline administrative formalities through better use of information, communication and positioning technologies. To deliver on the overall objective, the Action will develop, test and validate an integrated inland port information system in line with the provision of Commission Regulation 414/2007.

In addition, the Action will analyse cross-border options and opportunities for interconnection. The Action is part of a Global Project addressing the overall development of Hungarian TEN-T ports.

The Action will have positive impacts on competitiveness of inland waterway transport, modal split, traffic management, service quality, safety and security.

Project name: **RPIS 4.0 – Smart Community System for Upper Rhine Ports**

Funding programme: **Interreg Oberrhein/Rhin Supérieur**

Timeframe: **2019-2022**

Focus: The RPIS project “4.0 – smart community system for Upper Rhine Ports” aims to improve the performance and competitiveness of multimodal transport through the integration of digital

solutions in the global supply chain and thus be able to promote modal reporting on clean transport modes such as inland navigation.

The project focusses on 3 main objectives

- *Strengthening multimodal freight transport*

Through the implementation of the priority extensions of the RPIS traffic management platform to a Port Community System, the management of bulk river traffic and rail freight traffic in the Upper Rhine will be strengthened. In addition, an extension to the port platforms of the Upper Rhine not yet connected.

- *Improving the offer of cross-border services for Rhine navigation operators:*

The optimisation of the platform's operation through the integration of real-time data managed by other river information services (E-RIS, AIS), as well as data from the Cargo Community Systems of major seaports, will allow for a rapid and transparent data exchange between all stakeholders. The best planning of the barge calls, the optimisation of the use of port infrastructures and the exchange of digital data will constitute a real added value for the users.

- *Strengthening sustainable mobility in freight transport:*

The establishment of an Upper Rhine port community promotes multimodal transport solutions in the Upper Rhine in a sustainable way. It is made up of actors in the field of transport and logistics, but also of scientific representatives, ports and administrations competent in this field.

The platform will also contribute to the continued development of new digital services for the port community, notably by local start-ups.

Project name: Port IoT for Environmental Leverage

Funding programme: H2020

Timeframe: 2020-2022

Website: www.dataports-project.eu

Focus: DataPorts will provide a data platform in which transportation and logistics companies around a seaport will be able to manage data like any other company asset, in order to create the basis to offer cognitive services.

DataPorts includes the deployment, testing and showcase of the data platform in two relevant European ports (Valencia, Thessaloniki), where it will be connected to the existing digital platforms to collect data, will provide sharing rules and added value to data owners, and on top of which the pilots will develop AI and cognitive applications to solve specific problems and improve processes for each pilot.

The project also includes two global use cases involving those ports where the platform provides inter-port data sharing and connect to other actors to improve processes at a large scale.

Project name: Towards a green and sustainable ecosystem for the EU Port of the Future

Project Acronym: PortForward

Funding programme: H2020

Timeframe: 2018-2021

Website: www.portforward-project.eu

Focus: The European research project PortForward, which began in July 2018, has set itself a major goal. Under the direction of the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg, 13 partners from Germany, Spain, Italy, Greece, the United Kingdom and Norway want to develop new concepts in order to operate small and medium-sized ports with the help of digital solutions in a smarter, more networked and environmentally friendly way. Five European ports are involved in the PortForward project, where the new solutions will be developed and tested.

3.2 Port digitalisation success stories

The following list provides some success stories from other European regions that may serve as examples of good practices for port development in the Danube Region.

The **Port of Hamburg** has conducted tests with 5G, the next-gen communication network in diverse applications. Sensors on ships were installed to transmit movement and environmental data in real time across large areas of the port. In another test, the port linked traffic lights to the mobile network in order to control traffic remotely through the port, as well as improving safety and efficiency processes. A third trial allowed the port to access all the data it collects outside of existing networks, transmitting 3D data to an augmented reality application. The success of the trials could lead to more secure links between ports and logistics companies and provide the foundation for a more intelligent- Internet of Things (IoT) -supply chain.

Website: <https://www.hafen-hamburg.de/en/>

The **Port of Amsterdam** first introduced its Digital Port Programme in 2017. By making data available using digital services, the port became more transparent for users and was able to handle vessels more quickly and intelligently. The port was also the first to create a test zone for aquatic drones and more recently trialed a new monitoring system to explore drone usage in its airspace

Website: <https://www.portofamsterdam.com/en>

The PortForward of **Rotterdam** includes software tools that enables port authorities to manage their port operations more efficiently and safely and reduce costs on the assets. The solution encourage collaboration and coordination between all port users, allowing for faster handling of ships, trains and inland vessels. This leads to a strengthening of the port's competitive position. PortForward additionally offers digital solutions for shippers, freight forwarders and traders who want to increase their insight and control of their logistic chains. Consider for example a smart route planner that displays all the transport options from the coast through to the hinterland.

Website: <https://www.portofrotterdam.com/en>

The **Port of Antwerp** has centered its operational improvement plan on NxtPort, an "information sharing system." The goal for its use of NxtPort, which allows the port to share information with companies like BASF, MSC, Katoen Natie, DP World and PSA, is to " become a self-sustaining data-commercialization company that will gather, centralize, store, analyze and exchange data from a wide variety of logistic actors." Eventually, customs, governmental agencies, food quality control, and IT app developers will be able to access the information on the platform as well. The port also plans

to monetize the data it is receiving from the system, which will help "individual users reduce costs through better planning." Moreover, not only will this generate more income for the port, but it will also improve logistics, lower truck exhaust emissions, and reduce the number of containers in depots. The Port of Antwerp is also exploring the use of blockchain for container collection, which will allow "digital rights" to be transferred from one party to another, which means only one party can pick up the container, rather than anyone with a PIN number. This will reduce fraud by validating the container transfers.

Website: <https://www.portofantwerp.com/en>

The Spanish **Port of Valencia** has been named the smartest port in the Spanish port system, leading the ranking in categories such as environment. The port of Valencia has been trialing since 2018 Internet of Things (IoT) technology aimed at improving its operational efficiency. For example, truck fleets have been equipped with dedicated IoT devices, allowing for near real-time tracking of movement of vehicles in order to help the port authority predict and manage potential congestions, as well as to anticipate truck arrivals at the gates. The Port of Valencia installed black boxes on "200 cranes, straddle carriers, trucks and forklifts" that collect a variety of data "such as their location or energy consumption, which could help terminal staff find ways to reduce idle time. The information from the black boxes is analyzed in real time and shared with terminal staff to "identify operating bottlenecks and initiate appropriate action." The anticipated results of the black boxes include lowering operating costs by 10% by "reducing equipment idle time and minimizing energy use." Additionally, this port installed a smart illumination system that only light up when vehicles come in the vicinity of the port, which has cut energy consumption by 80%.

Website: <https://www.valenciaport.com/en/>

The **Port of Barcelona** uses the PortIC telematic platform, which connects the entire Port Community. This smart platform ensures "coordinated management of all the services provided in the Port's waters (pilots, tugs, mooring, provisioning, etc.); and the storm forecasting system developed jointly with the national authority Puertos del Estado." The port is also in the process of implementing a project to "collect Radar and AIS (Automatic Identification System) signals from vessels passing through the Port in order to anticipate possible incidents." This is expected to increase the port's safety. The Ecocalculator, a tool in use at the Port of Barcelona, allows customers to "quantify their cargo's environmental footprint" and meet their environmental goals. Barcelona's Container Tracking Application allows the port and container owners to track "the physical process of a container, from the moment the vessel arrives, when the container touches the ground, is processed by customs, leaves the terminal and other points."

Website: http://www.portdebarcelona.cat/en/home_apb